

Standard Practice *in* Sheet Metal Work

Manual No. 2

F L A S H I N G S

SHEET METAL CONTRACTORS' NATIONAL ASSOCIATION, INC.

An Organization of Ventilating and Air Conditioning, Warm Air Heating,
Industrial Air Handling, Architectural Sheet Metal, Roofing Contractors

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FLASHINGS

SHEET METAL CONTRACTORS' NATIONAL ASSOCIATION, INC.

170 DIVISION STREET • ELGIN, ILLINOIS

*A National Organization to Improve, Extend and Protect the Uses of Sheet Metal
in Ventilating and Air Conditioning, Warm Air Heating, Industrial Air Handling,
Architectural Sheet Metal, Roofing.*

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SHEET METAL CONTRACTORS' NATIONAL ASSOCIATION, INC.

170 Division St., Elgin, Illinois

FOREWORD

In 1929, the National Association of Sheet Metal Contractors (dissolved in 1933) published "Standard Practice in Sheet Metal Work," a 750 page reference book of standards of practice in fabricating and erecting sheet metal work.

Several years of exhaustive research and study, by scores of men comprising the sub-committee which prepared Sections covering particular phases of sheet metal construction, preceded the actual publication.

Much of the construction shown in Standard Practice in Sheet Metal Work was, at the time of its publication, original material — not to be found in other published literature of the industry. Many of the constructions shown had their origin in the very old craftsmanship brought to this country by the sheet metal artisans who came to America in the last century.

To this basic heritage was added the new materials and new techniques of the first quarter of the twentieth century.

The men who prepared Standard Practice in Sheet Metal Work created even beyond their vision. While the industry has advanced notably in the years since publication of this book, basically most of the constructions shown in Standard Practice in Sheet Metal Work are, today, as applicable as they were in 1929.

Standard Practice in Sheet Metal Work was widely distributed among the architects of the 1930's. But in the 1930's, through a series of circumstances, plates, unbound pages, drawings, manuscripts passed out of existence.

Today, despite the greatly enlarged literature of the industry, there is a growing demand for copies of Standard Practice in Sheet Metal Work. To meet this demand, the Architectural Sheet Metal Manuals Committee of the Sheet Metal Contractors' National Association, Inc., has undertaken the publication of a series of Manuals to replace the former book. Each Manual will deal with one of the major phases of present day sheet metal construction.

These Manuals make use of a large part of the text and drawings from Standard Practice in Sheet Metal Work. Where necessary, original text and drawings will be supplemented by information which accommodates the new materials and new techniques which have become acceptable since 1929.

The Sheet Metal Contractors' National Association has been given permission to use material from Standard Practice in Sheet Metal Work by the heirs of the estate of George Harms, the General Chairman of the Trade Development Committee of the former association. This permission is sincerely appreciated.

SHEET METAL CONTRACTORS' NATIONAL ASSOCIATION, INC.

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ACKNOWLEDGMENT

This Manual of construction for sheet metal work is made possible only because of the foresight and immeasurable labors of the members and section chairmen of the Trade Development Committee of the former National Association of Sheet Metal Contractors and the guiding spirit of these farsighted committeemen—the General Chairman—George Harms of Peoria, Illinois.

Through his untiring efforts, Standard Practice in Sheet Metal Work developed from a dream of the industry into a reference guide of proper construction for sheet metal contractors and the architects and engineers who design and specify sheet metal work.

Through his willingness to contribute financially, far beyond his just share, Standard Practice in Sheet Metal Work was printed and is recognized as one of the monumental books of the construction industry.

So that these services which George Harms gave so generously to this industry may be for all time perpetuated in the minds of his fellow sheet metal contractors and those who buy our services, the Sheet Metal Contractors' National Association, Inc., hereby dedicates this Manual to the memory of the man who wrought so well to establish the sheet metal industry on a high plane —

GEORGE HARMS

1860—1945

CONTENTS

TEXT PAGE		DRAWING NUMBER	DRAWING PAGE
iii	Foreword		
iv	Acknowledgement		
1	Why Through Wall Flashings.....	Fig. A	2
		Fig. B	3
		Fig. C	4
5	Expansion and Contraction	Chart	5
7	Expansion Joints	Detail 1	9
		Detail 2	10
		Detail 3	11
		Detail 4	12
		Detail 5	13
		Detail 6	14
		Detail 7	15
		Detail 8	16
17	End Joints	Sketch	17
18	Flashings at Composition Roofing.....	21	18
19	Flashings With Composition Roofing.....	22	20
21	Flashings at Tile Deck Roofing.....	24	21
23	Flashing Used at Tile Deck Roofing.....	25	22
23	Gravel Stop and Approved Strainer.....	26	24
27	Open Valley on Shingle, Slate, Flat Tile Roofs.....	29	25
27	Closed Valleys on Slate, Tile, Shingle Roofs.....	30	26
27	Hip Flashing and Covering on Slate, Tile Roofs.....	31	28
29	Hip and Ridge Flashing for Slate, Tile Roofs.....	34	30
29	Chimney and Saddle Flashing for Slate, Tile Roofs.....	35	31
33	Flashings On Rubble Stone, Stucco Chimneys.....	36	32
33	Dormer Window Flashing at Slate, Tile Roofs.....	37	34
33	Dormer Window Flashing With Stucco Cheeks.....	38	35
37	Flashing, Sheet Metal Covered Dormer Window.....	39	36
37	Gable Wall Flashing on Slate, Tile Roofs.....	40	38
37	Wall Flashing on Slate or Tile Roofs.....	41	39
41	Parapet Wall Flashing.....	42	40
41	Deck Molding and Flashing at Mansard Roof.....	45	42
43	Saw Tooth Roof—Ridge Mold and Flashing.....	48-48A	44-45
43	Eaves and Verge Finish for Metal Roofs.....	51	46
47	Base and Cap Flashing on Various Walls.....	52-52-A	48-49
51	Cornice Covering and Outlet Drainage Tubes.....	70	50
51	Cornice and Balustrade Flashing.....	71	52
55	Balcony Rail and Door Sill Flashing.....	72	53
55	Stone Cornice Flashing with Outlet Tube.....	73	54
57	Water Table Flashing on Slate, Brick Veneer Walls.....	74	56
57	Window Frame Flashing on Shingle, Brick Walls.....	75	58
61	Window Frame Flashing on Metal Lath Walls.....	76	59
61	Band Mold and Timbered Wall Flashing.....	77	60
63	Coping Over Brick Gable Wall.....	78	62
63	Molded Coping and Wall Covering.....	80	64
63	Sheet Metal Copings on Horizontal Walls.....	81	65
67	Coping at Adjoining Old and New Walls.....	82	66
67	Corrugated Roofing and Siding on Wood Frame.....	1A-1B	68-69
70	Special Details—Cap-Base Flashing—	Detail A	70
	—Cap-Base Flashing submitted by Olson		71
	—Cap-Base Flashing submitted by Pauley		72
	—Scuttle and Curb	Detail	73
75	References		

Why Through-Wall Flashings

Older types of wall construction, embodying thick masonry walls did not have and did not need through-wall flashing.

But present day construction, using structural steel and comparatively thin exterior walls, unless protected with flashings, permit wind driven rain to penetrate the thin walls. Moisture also enters such thin walls through the masonry joints and forms pockets of water which, eventually, may work itself into the interior of the building, by capillary action.

Also, today's thin exterior walls, even though the materials themselves may be waterproof, cannot be considered permanently impervious to wind-driven water. The gradual shrinkage of some materials and the natural movement of buildings, may eventually lead to leaks.

It is, therefore, desirable to have permanent water barriers at all places where rain water and moisture entering the exterior wall can work its way through to the inside, or can come in contact with the wood or steel members of the wall.

This penetration of water through walls is one of the principle problems of modern structural design. Through-wall flashings, of permanent metal, is today considered the most satisfactory method of permanently preventing leaks.

Today's metal through-wall flashings are available in several metals of which copper is perhaps the most common material.

Through-wall flashings are available in many forms—deformed by ridged, ribbed, embossed patterns. The purpose of the deformation is to provide depressions in the sheets for mortar bond and to form keys in all directions. Such deformed sheets are also stiffer than plain flat sheets and require no soldering. The ends of the sheets or sections lock and hook together to form watertight joints and the deformities take care of expansion and contraction.

Experience has shown that such deformed through-wall flashings form a positive mechanical bond that fails only when the mortar shears. Plain flashings lack such bonding qualities and a smooth surface prevents a bond and weakens the wall.

In general, there are two basic types of through-wall flashings—(1) Flashings which go through and extend beyond the wall and (2) flashings which are entirely concealed within the wall.

Today's practice is to specify through-wall flashing—under all copings; at the bases of all parapets and walls that adjoin or penetrate roofs; side walls at all floor levels; at all openings in the wall.

More specifically, through wall flashings are installed at the following locations in exterior masonry walls—under masonry copings; over roof base flashings; over spandrel beams and other horizontal steel members in walls; under masonry chimney caps; over reinforced concrete beams in walls; between the top of concrete foundation walls and the bottom of masonry building walls; over cornices; over projecting belt courses; under belt courses which do not project beyond the face of the wall; under belt courses where the wall thickness is reduced; over doors, windows and openings; under sills; over and under ornamentation built into walls.

The three Figures which follow—Fig. A, Fig. B, Fig. C, illustrate these locations in exterior walls where leaks are likely to occur and a permanent water barrier—through wall flashing—is needed. The 32 details which make up these three Figures are not explained in detail because such explanation is not necessary and the Figures are intended to demonstrate where and how through-wall flashings are used.

Figures A, B; C, are reproduced from the Manual "Sheet Copper," Copper and Brass Research Association, New York, N. Y.

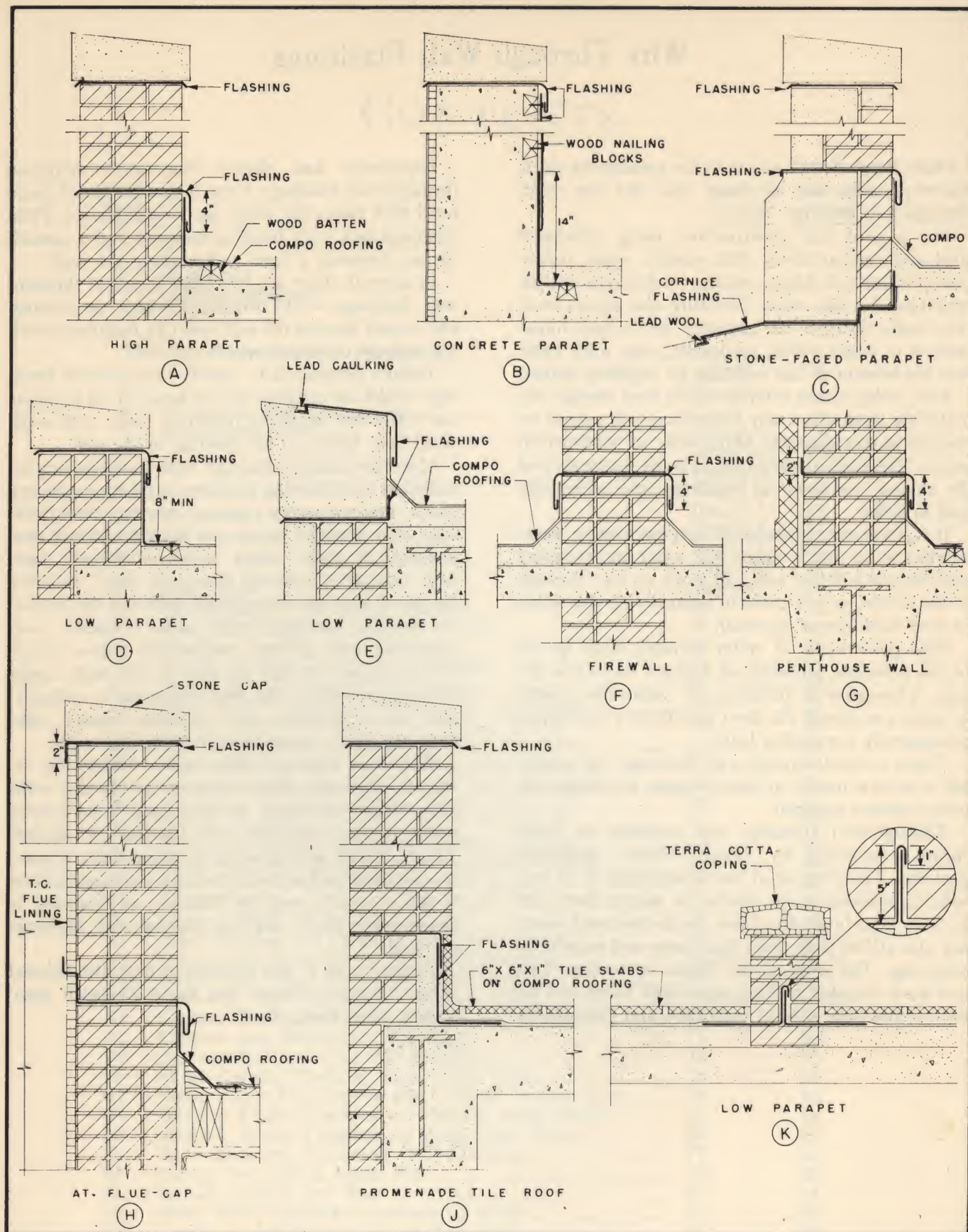


FIG. A

WALLS & PARAPETS

COPPER AND BRASS RESEARCH ASSOCIATION

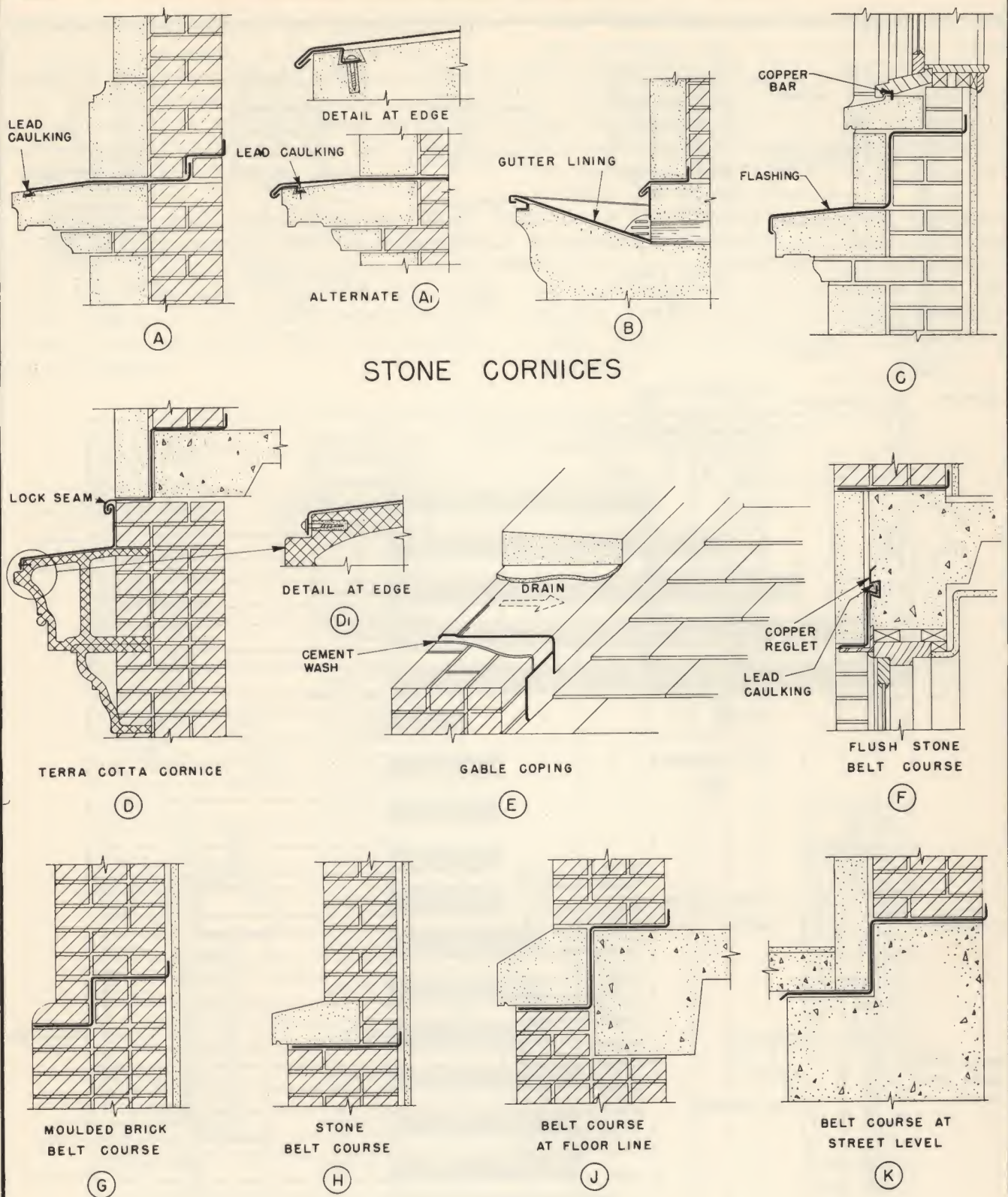


FIG. B CORNICES & BELT COURSES

COPPER AND BRASS RESEARCH ASSOCIATION

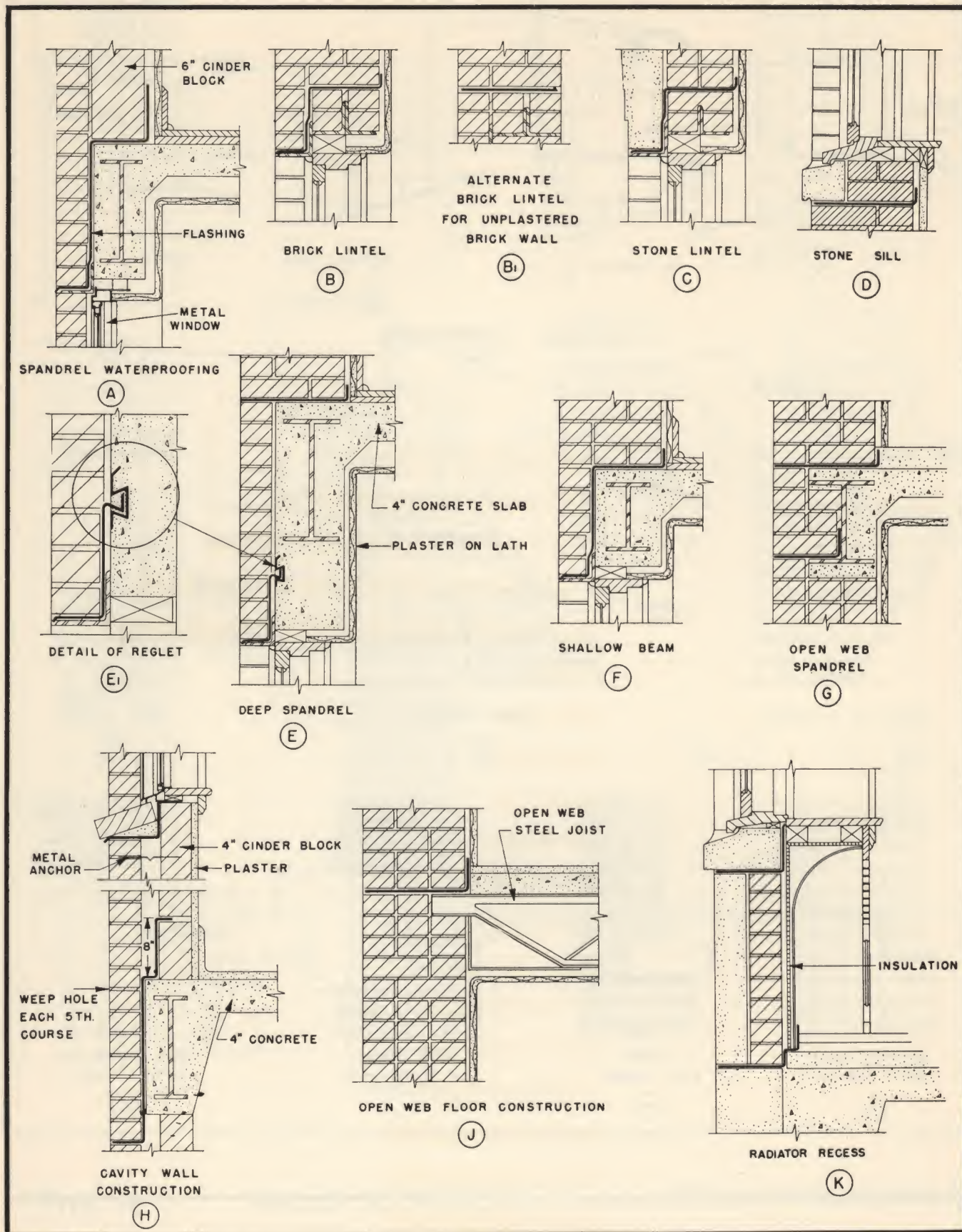


FIG. C

WINDOWS & SPANDRELS

COPPER AND BRASS RESEARCH ASSOCIATION

Expansion and Contraction

The necessity for providing for linear expansion and contraction movement in all metals used for flashings or metal construction is well understood.

The question is how much provision must be made according to the expected highest and lowest local temperatures and according to the temperatures at the time of installation.

Some building metals expand more than others. The Table-Chart reproduced following, submitted by the Research and Development Department of Revere Copper and Brass Incorporated, shows expansion in terms of 1/64 inch increments for an increase in temperature of 100 Deg. F. for a 10-foot length of material.

The Table-Chart shows that copper will have more movement than iron, steel or Monel metal, and less than aluminum, lead or zinc.

Temperature conditions at the time of installation must be considered. Metal laid in hot weather needs little space for expansion, but does require provision for contraction. The reverse is true for work done in cold or cool weather.

Also of interest is information from the Bureau of Standards, Washington, D.C. on the National Museum copper roof tests covering a period of about one year. Simultaneous air temperatures were also recorded. This information comes from the manual "Sheet Copper" of Copper and Brass Research Association.

UNIT LENGTH 10'-0"		INCREASE IN LENGTH TO NEAREST 1/64 INCHES DUE TO AN INCREASE IN TEMPERATURE OF 100°F													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
COPPER	.0000093														
TIN	.0000117														
ALUMINUM ZS	.0000138														
LEAD	.0000164														
ZINC ROLLED	.0000174														
FIR PARELLEL TO GRAIN	.0000021														
PINE PARELLEL TO GRAIN	.0000031														
BRICK MASONRY	.0000031														
RUBBLE MASONRY	.0000035														
LIMESTONE	.0000044														
GLASS	.0000047														
MARBLE	.0000056														
SLATE	.0000058														
STEEL MEDIUM	.0000067														
GALVANIZED IRON	.0000067														
WROUGHT IRON	.0000067														
MONEL	.0000078														
CONCRETE	.0000078														
STAINLESS STEEL	.0000008														
CAST GYPSUM PLASTER	.0000091														
PLASTER	.0000092														

These tests showed that during the night roof and metal temperatures remain quite uniform. The minimum temperature was reached at 5 o'clock in the morning. While the sun was down, the roof metal temperatures ran slightly less than the air temperature. This was due to radiation of heat from the metal to the air. This under-cooling ran from 10 Deg. to 16 Deg.

When the sun came up, the metal temperature rose sharply. The effect of clouds was marked even though the air temperature remained stable. The difference between metal and air temperatures, when the sun was shining was large.

On rainy days, or when the sun was obscured by heavy clouds, the effect was similar to night conditions.

An idea of typical recordings in the Bureau tests showed—

Max. Roof Temp. (Washington) ..	147 Deg.
Corresponding air Temp.....	103 Deg.
Min. Roof Temp. (Washington) ..	10 Deg.
Corresponding air Temp.....	11 Deg.
Max. Rate of Change in 6 hrs.....	0.2 Deg. per Min.
Max. Rate of Change in 30 Min....	1.5 Deg. per Min.
Max. Av. Daily Range.....	63 Deg.

These tests were on a roof with a patina. New copper would have a lower coefficient of absorption and a higher coefficient of reflection and so will show a lower range of temperatures.

Under exceptional circumstances, a copper roof may reach a temperature of 180 Deg. Over much of the United States probably 150 Deg. will rarely be exceeded.

The forces of expansion and contraction are tremendous. Concrete pavements shattered by heat are proof of this statement. A copper sheet laid at 90 Deg. and fastened to prevent any movement will, through a temperature range of from 20 Deg. below to 150 Deg. above zero set up stresses approximating 28,000 pounds per square inch.

To insure unrestricted movement of metal laid as covering, it is suggested that the saturated asphalt paper commonly used under metal should be separated from the metal by a smooth building paper so that the asphalt will not "bleed" under heat and "bind" the metal.

This explanation of expansion and contraction points up the importance of sufficient "Expansion Joints," "End Joints" and all mechanical methods for joining sections together, described in other sections of this Manual.

Expansion Joints

Some means is often required to provide for expansion and contraction of the structure—particularly in long buildings. After the provision has been made in the building itself, the open joint must be protected from water by a protective capping of permanent metal.

This calls for expansion joints.

The several details and explanation following, illustrate and describe a number of expansion joints which experience has shown to be practicable and protective.

Detail 1 shows two variations of a simple Accordion Fold Expansion Joint. Along the roof, the endwise or end joints should be locked and soldered, except the expansion joints, occurring generally not over forty feet apart, which should be of the flat type with return bends and a loose locking cover. The several pieces of the vertical expansion joint only need to be weather lapped about two inches and fastened to the construction at the top edge to hold them in place.

Detail 2 shows an Accordion Fold Expansion Joint in a brick wall and in a roof, composed of copper annealed with a torch to minimize cracking due to work hardening. As an added precaution against leaks, a cover piece is applied over these vulnerable bends at the changes of direction. This type of expansion joint, of the size shown, should not be farther apart than 100 feet.

Detail 3 shows a Double Tongue and Sheath Expansion Joint in a brick wall and in a roof. This type of expansion joint accommodates dimensional changes in every direction and does not create fatigue stresses in the joint metal. Changes in direction are simply made by using miter or bevel joints.

Details 1, 2, and 3 were developed in the office of Albert Kahn and Associates, Detroit, Michigan and submitted by The American Brass Company.

Detail 4 shows an expansion joint suitable for metal roofing at a building setback. The coping cover and counter flashing on the parapet wall should have free-sliding edges as shown in the sub-detail. The inner edge should be formed with loose single lock to the base flashing with a turn-back on the upstanding leg of the base flashing at least 1/4 inch greater than that of the counter flashing or coping cover. The expansion joint is built over a wood or other curb, as high as required for the area, and can be constructed as shown.

Detail 4 has been submitted by Henry E. Voegeli, Development Engineer, The American Brass Company.

Detail 5 shows an Expansion Joint at roof employing a cover which forms a weather-tight protection. Curbs at least 8 inches high are formed in the roof on both sides of the expansion space with curbs sloped to give the cover a minimum pitch of 2 inches per foot. Anchored wood plates for nailing are required.

The edge strips shown act as a cap flashing and are formed with projecting edges over which the standing seam cover is locked. The edge strip should be made from sheets not greater than 8 feet in length. They should be secured to the tops of the curbs with brass screws spaced not more than 6 inches apart.

To close the expansion space which is a vertical slot in the face of the wall, a V expansion piece is built into the masonry as shown in Section A-A of Detail 5. This expansion piece is made of 16 oz. cold rolled copper in suitable lengths and each piece is lapped over the next not less than 2 inches.

Detail 6 shows additional constructions. The parapet coping cap is protected as shown in Section E-E where formed strips are held in place by caulked reglets with a cap sheet locked as shown. Note one edge provides for movement.

Section D-D shows the protection on the inside vertical face of the parapet. The locking strips are built into the masonry. The cap strip is locked as shown with one lock providing for movement.

The standing seams used in the cover over the roof expansion space are spaced as shown in Detail B-B. A 3-in. copper cleat secured to the wood plate with two brass screws is locked into each seam. These cleats are placed in the high side only, thus securing the cover to that side and allowing movement to take place on the lower side. The standing seam cover is hooked over the edge strip on the higher curb in a 1-in. lock. On the lower curb, the cover is locked over the edge strip with a total projection two times the width of the expansion space E plus 1 inch as shown in Section B-B.

To facilitate erection, it is suggested that the preformed expansion joint cover on the parapet wall be made in two pieces and soldered together after installation. Where the expansion joint cover is bent at right angles, the locks should be slit, and

after bending, a separate angle piece of copper soldered over the slit as shown in Section B-B.

For low parapets, the curbs in the roof on both sides of the expansion space should be the height of the parapet. The locking strips in the coping stone are secured into a reglet as shown in Section E-E and continue out past the inside space of the parapet wall to lap the edge strip on the curbs at least 3 inches.

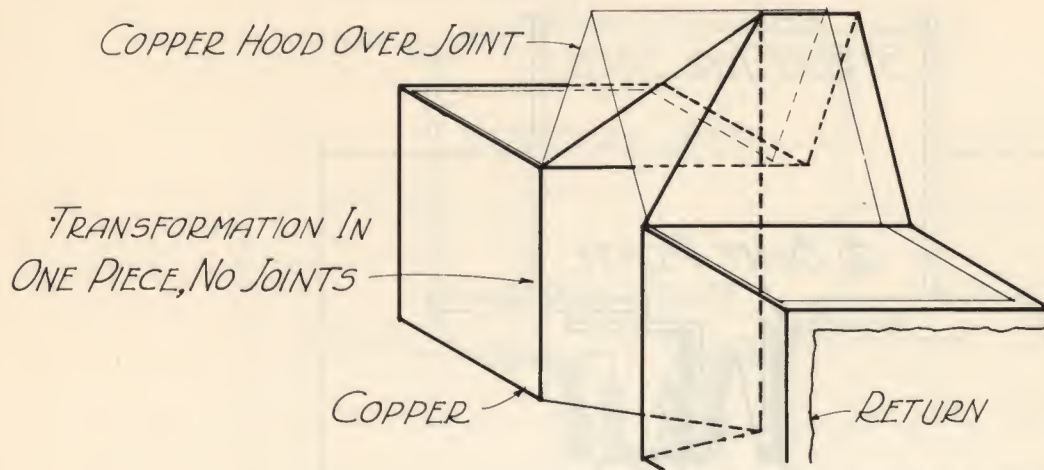
Detail 7 shows the installation of water stop units in expansion joints at corners and in straight walls of masonry construction. Units are formed in 8-ft. lengths and should run continuously from the footing to the eave or top of the parapet. Above grade the end joints should be soldered. Each flange on the unit should be built into the masonry joints not less than 4 inches. Premolded fillers or strips of compressible filler are used in place of mortar in the through joints. The mortar joint parallel to the di-

rection of movement in the wall is broken with strips of saturated roofing felt.

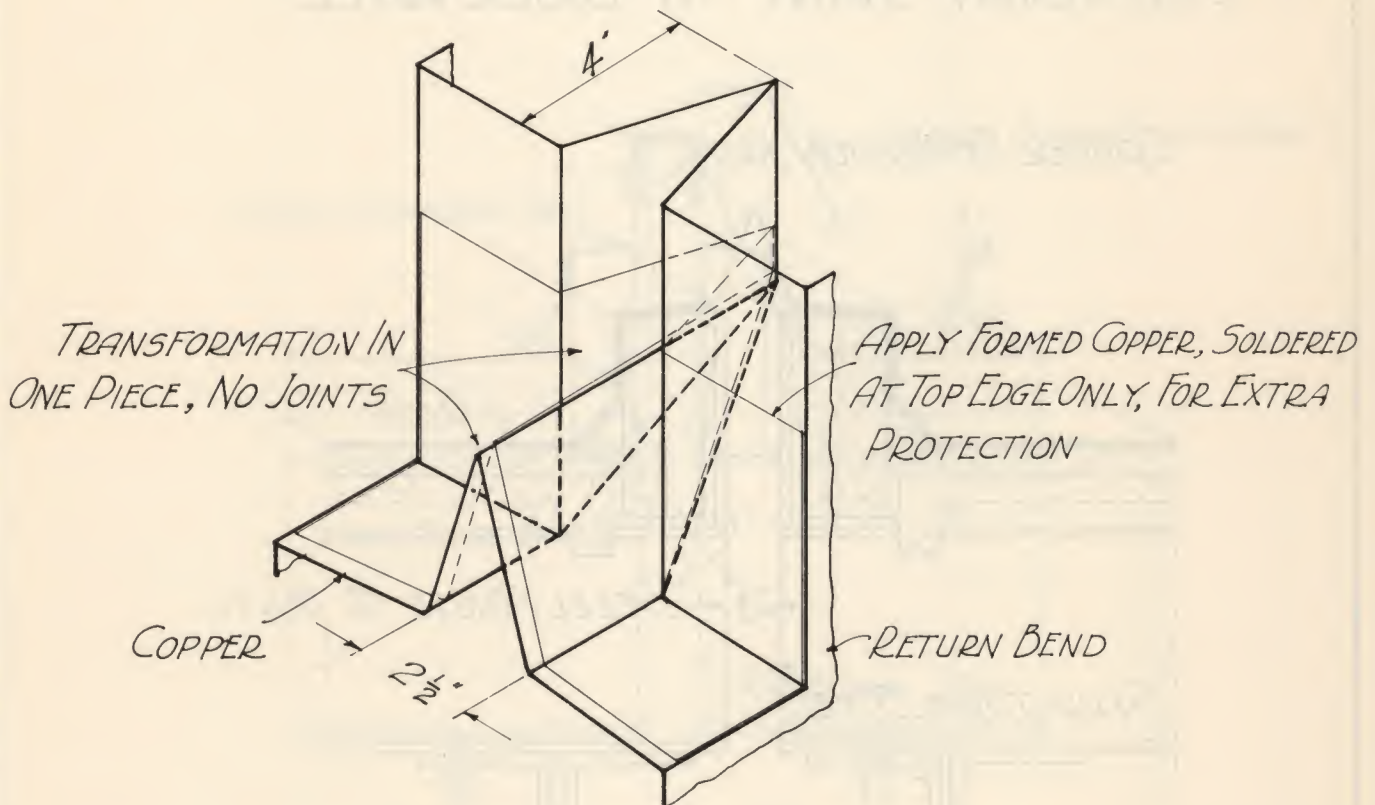
Detail 8 shows construction of expansion joints in floor slabs and ceilings. Water stops are made of not less than 16-oz. soft copper in 8-ft. lengths, with ends lapped 1 inch and soldered. A compressible filler is used to separate the slab sections. At the finished floor, brass angles are anchored to the concrete on both sides of the expansion joint with brass plates fastened to these angles to form a slip joint to provide for movement in the structure. At the ceiling, brass strips are secured to the wood grounds on both sides of the slot with a brass plate fastened to one strip to conceal the opening.

The constructions shown in Details 5, 6, 7, 8, and this explanation are reproduced from "Copper and Common Sense" of Revere Copper and Brass Incorporated.

ACCORDIAN FOLD EXPANSION JOINT

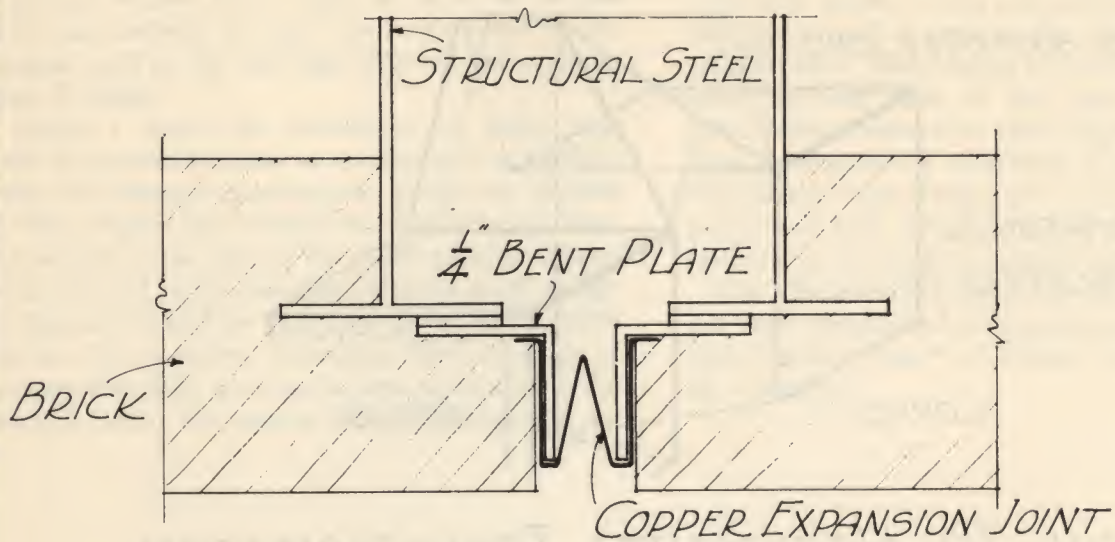


VERTICAL TO HORIZONTAL TRANSFORMATION

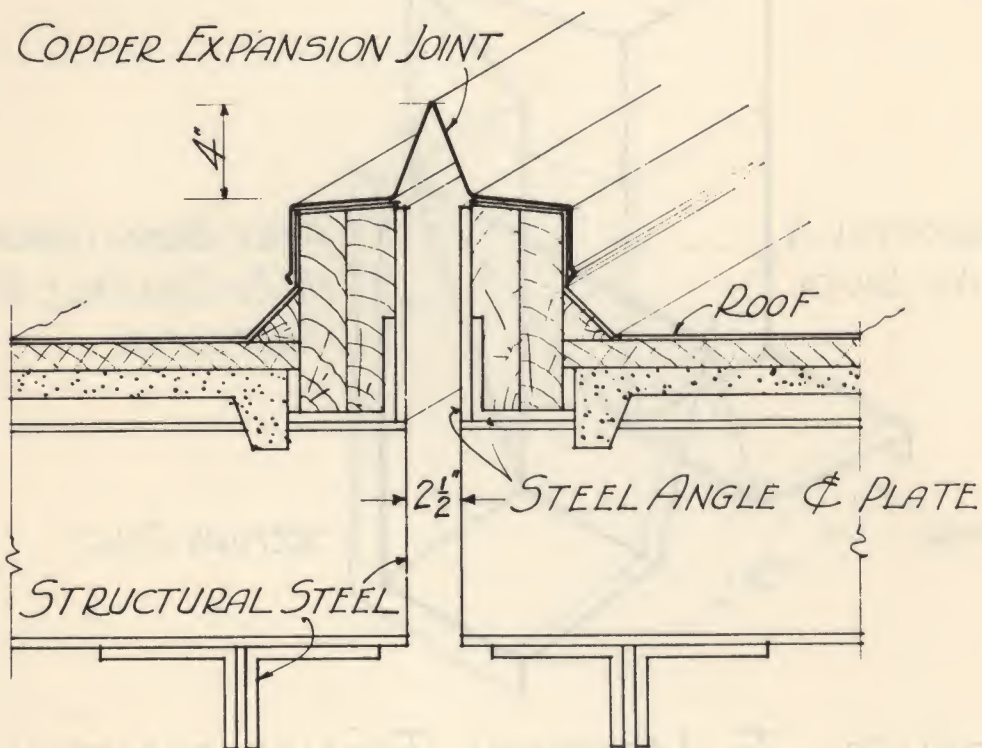


HORIZONTAL TO VERTICAL TRANSFORMATION

ACCORDIAN FOLD EXPANSION JOINT

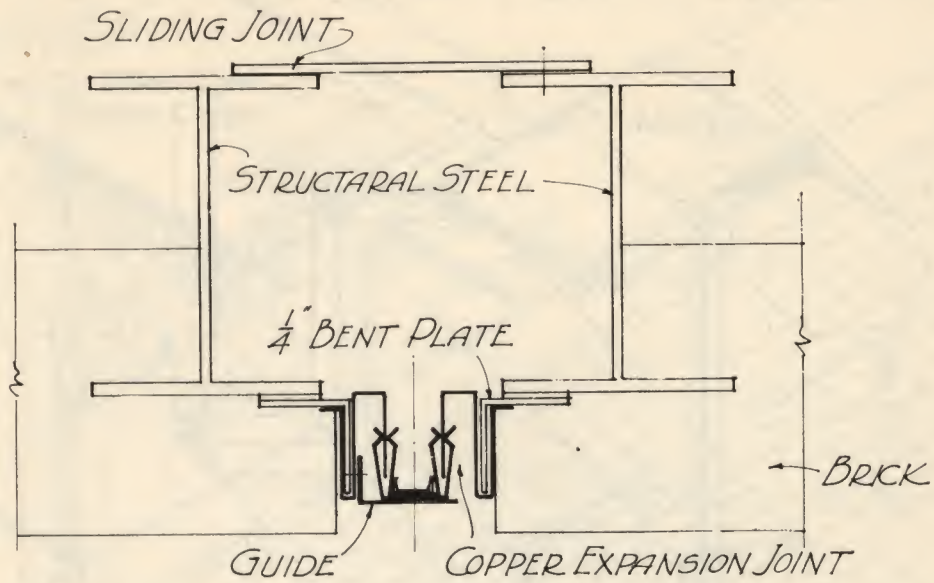


EXPANSION JOINT IN BRICK WALL

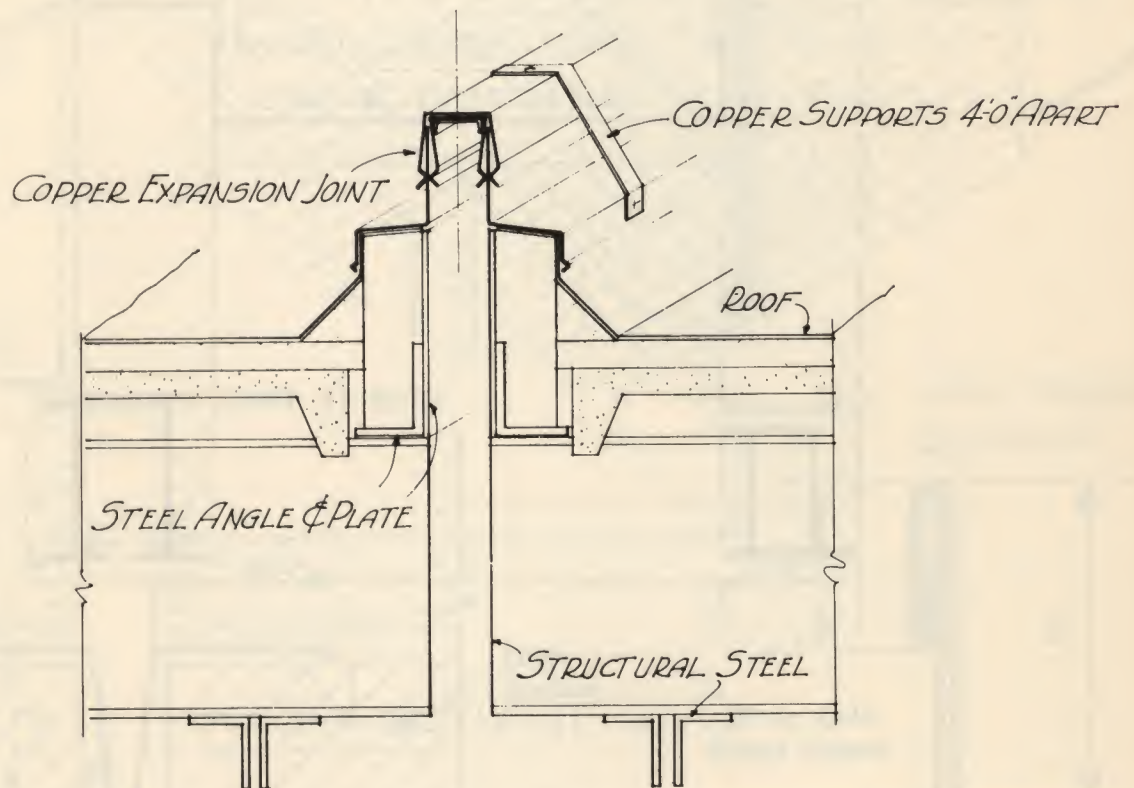


EXPANSION JOINT IN ROOF

DOUBLE TONGUE AND SHEATH EXPANSION JOINT

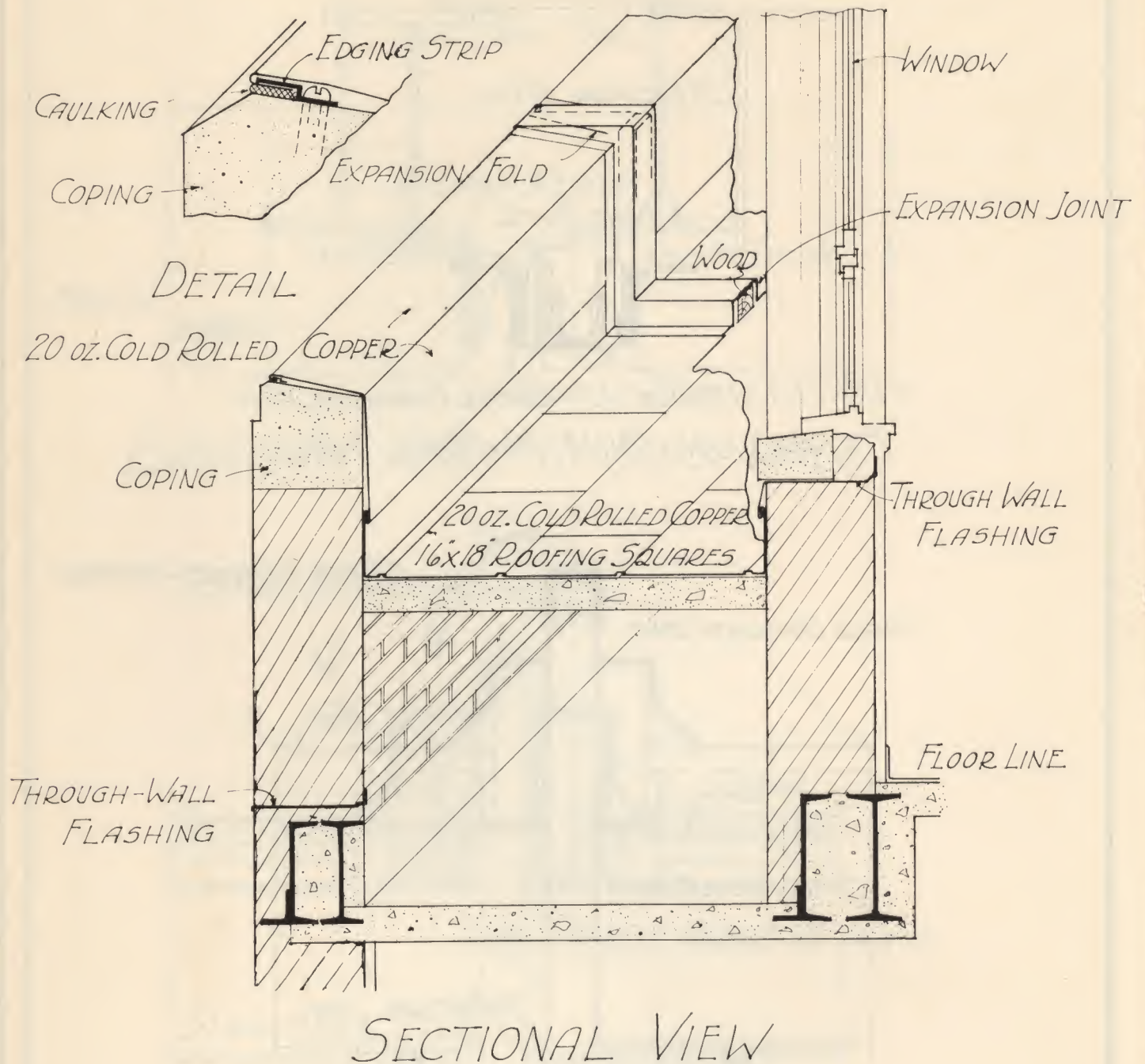


EXPANSION JOINT IN BRICK WALL



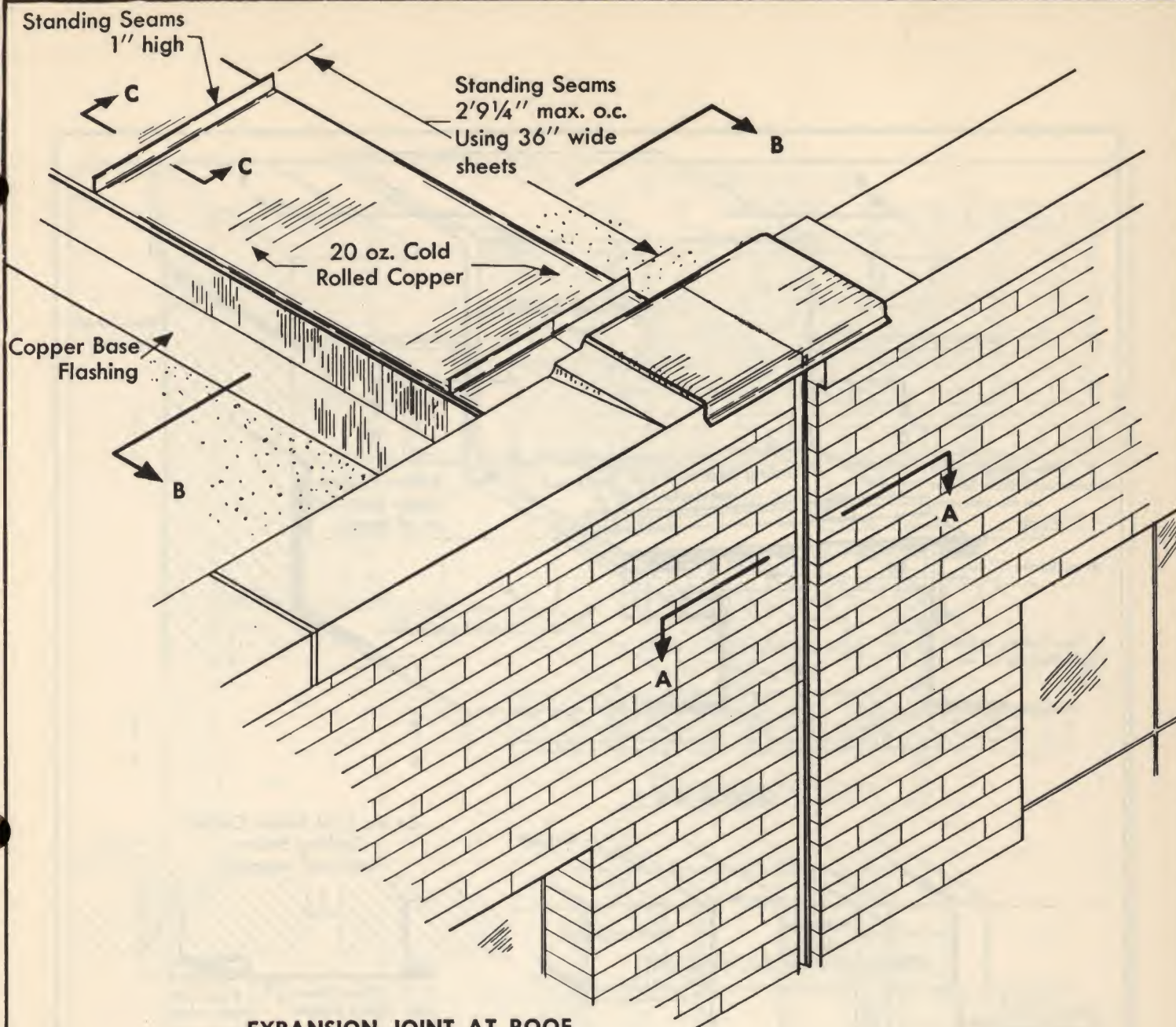
EXPANSION JOINT IN ROOF

COPPER ROOFING AT BUILDING SET BACK

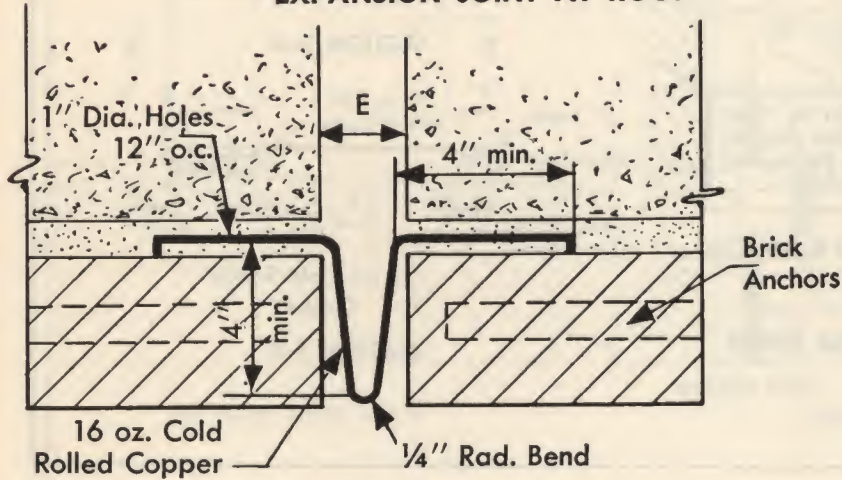


DETAIL **4**

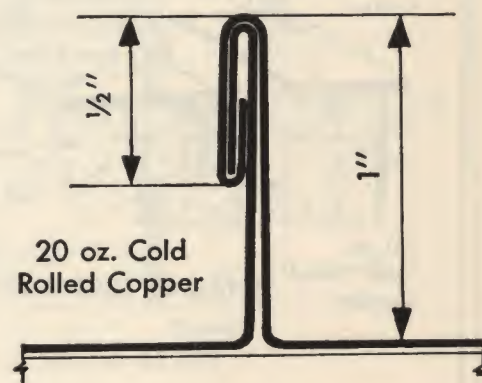
THE AMERICAN BRASS COMPANY
H. E. VOEGELI, DEVELOPMENT ENGINEER



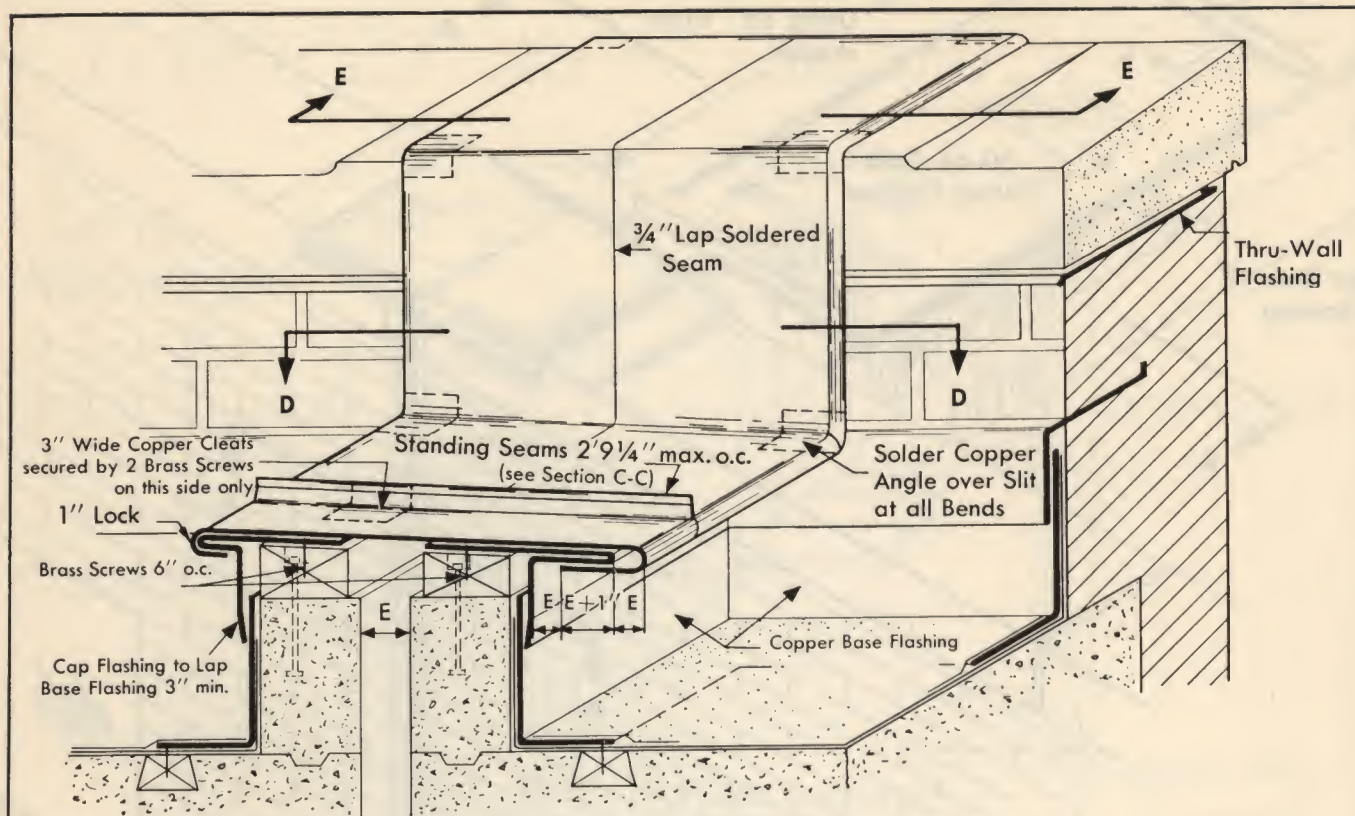
EXPANSION JOINT AT ROOF



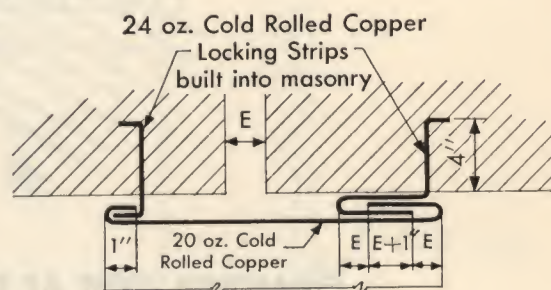
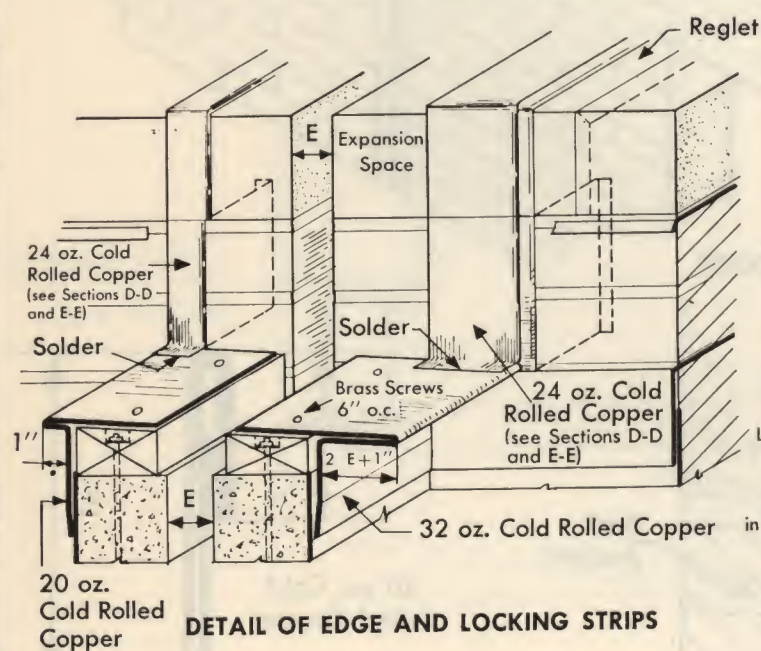
SECTION A-A



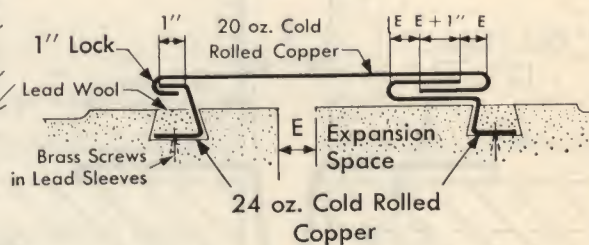
SECTION C-C



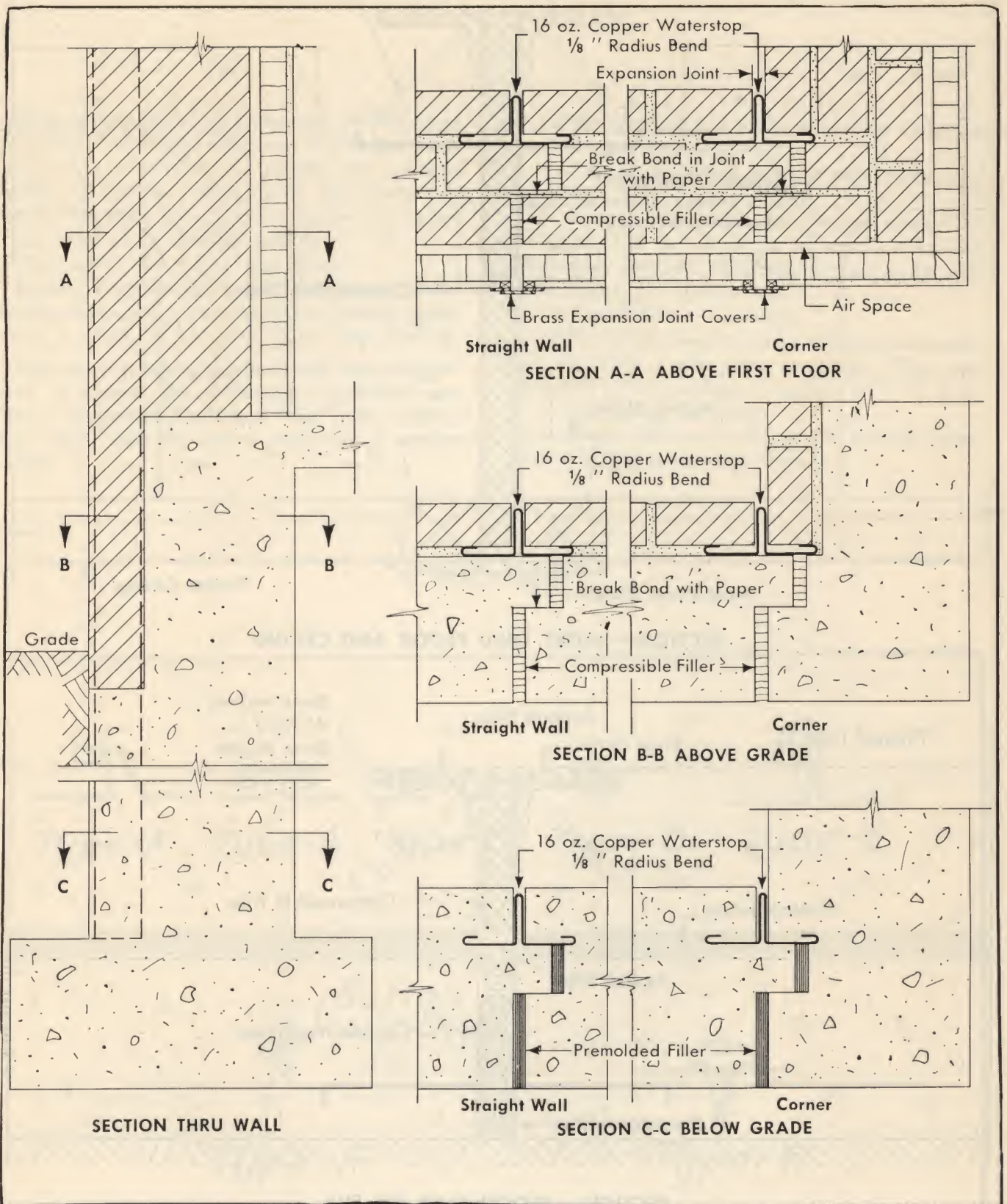
SECTION B-B



SECTION D-D

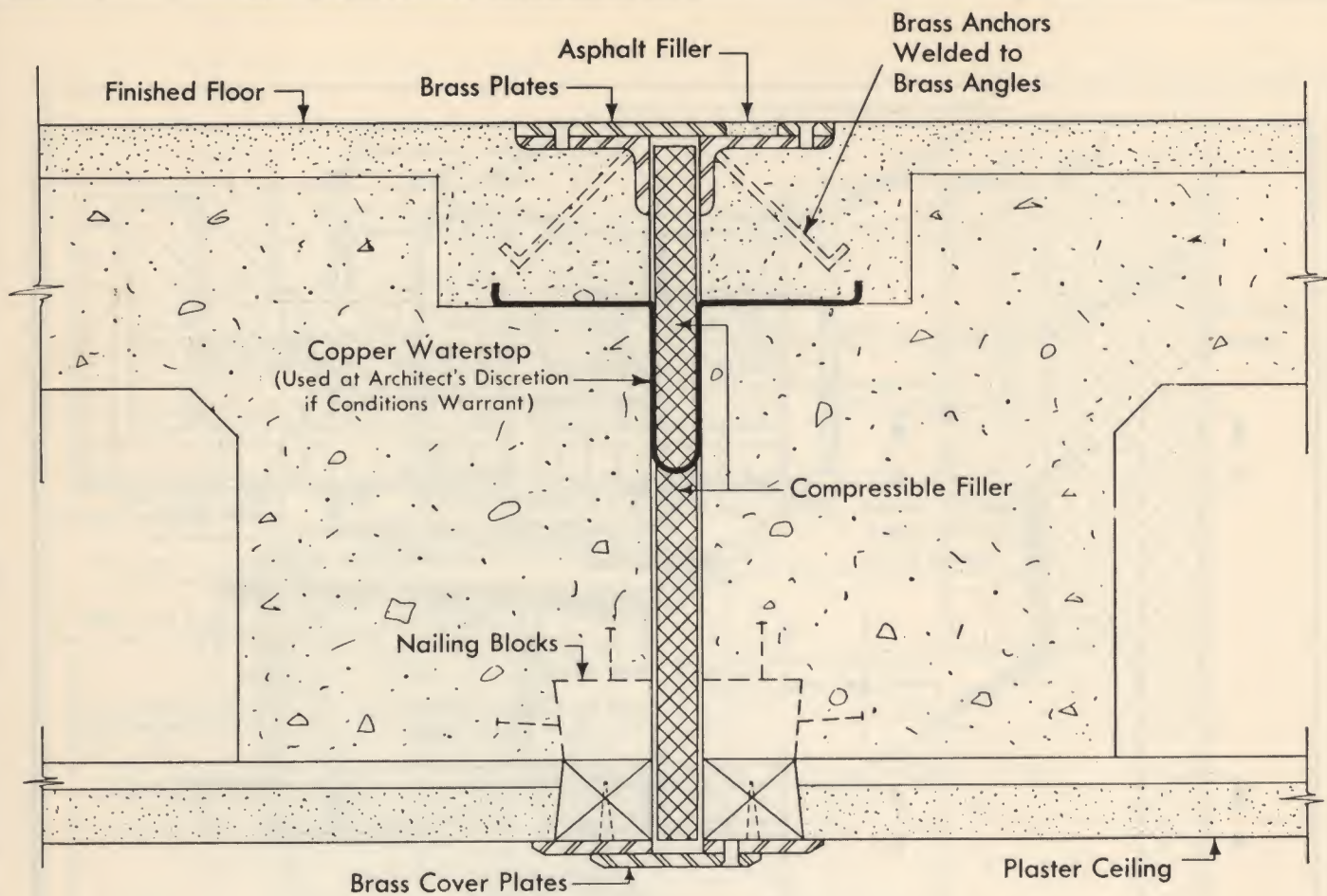


SECTION E-E

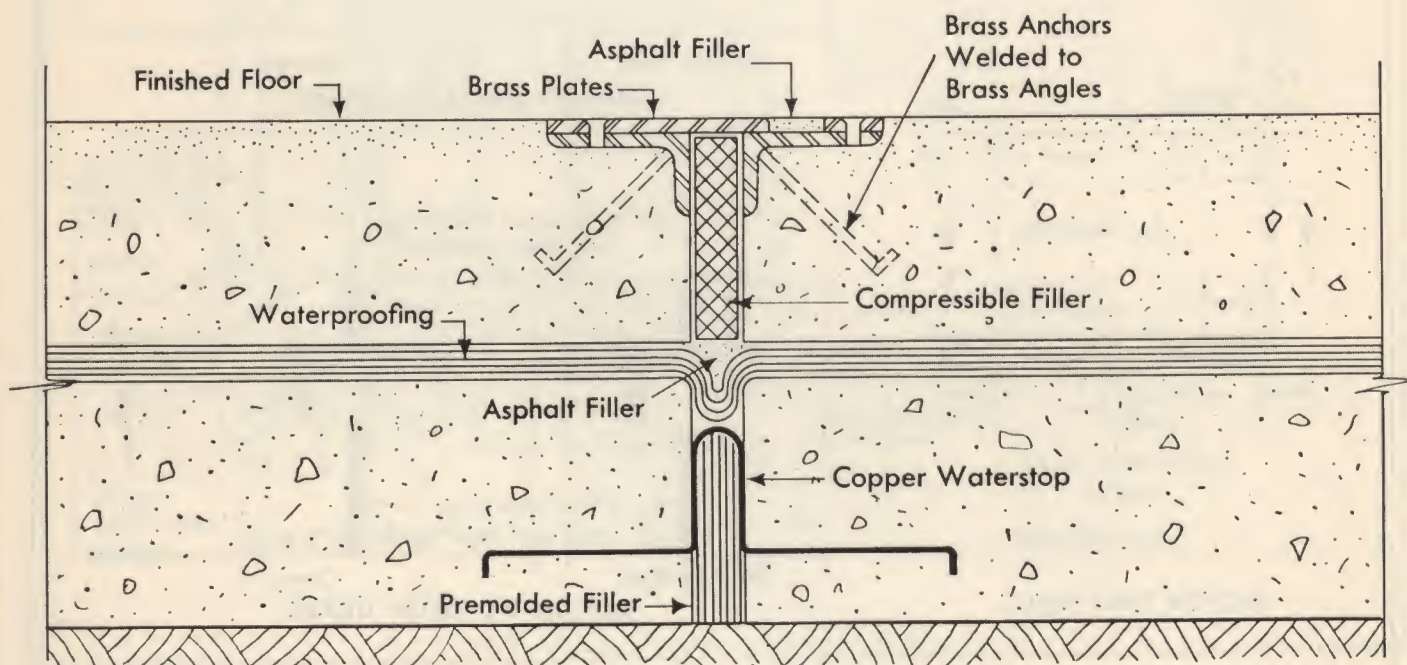


DETAIL **7**

REVERE COPPER AND BRASS INCORPORATED
RESEARCH DEPARTMENT



SECTION — JOINT THRU FLOOR AND CEILING



SECTION — FLOOR SLAB ON FILL

End Joints

Because flashings of all types must be fabricated and installed in lengths which can be handled, some means must be provided for joining these sections together to provide for expansion and contraction and, at the same time, prevent entrance of water at the joints of the flashing sections.

This requires the use of "end joints."

Because every installation has its own particular characteristics and requirements for flashing application, a variety of end joints have come into use.

This text is a brief analysis of end joint requirement. In general, the elimination of soldered end joints is suggested. The use of "slip" joint connections which allow for lateral movement is recommended.

Of the types of end joints in use, the following general types are mentioned:

1—Lapped joints with rivets or metal screws and soldered.

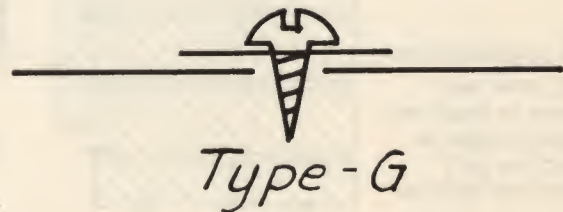
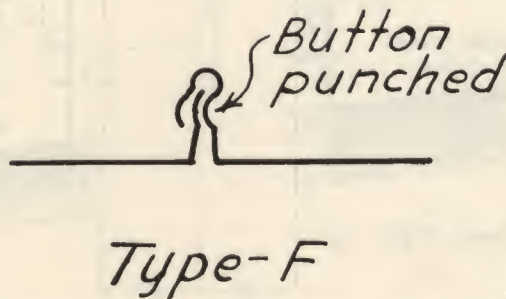
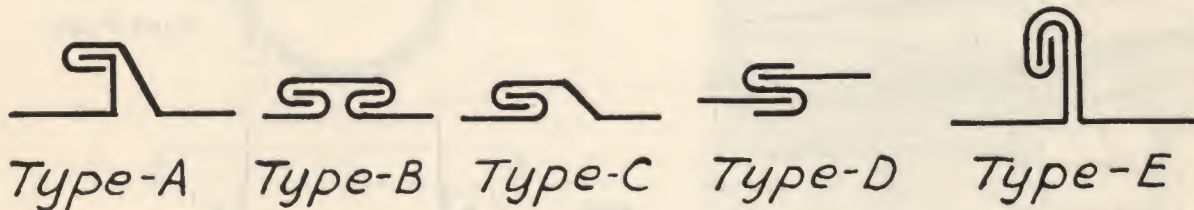
2—Lapped joints with no rivets or screws but soldered. The lap should be at least $\frac{3}{4}$ in. and thoroughly soldered. Such construction can be used with copper and Monel metal.

3—Locked joints — soldered.

4—Slip joints using no solder. In the drawing below six types of slip joints are shown. These are indicated in the drawing as Types A, B, C, D, E, F.

5—Lap joints—no solder.

6—Batten seam end joint. In the drawing below one such joint is shown in Type G.



Flashings at Composition Roofing

Drawing No. 21

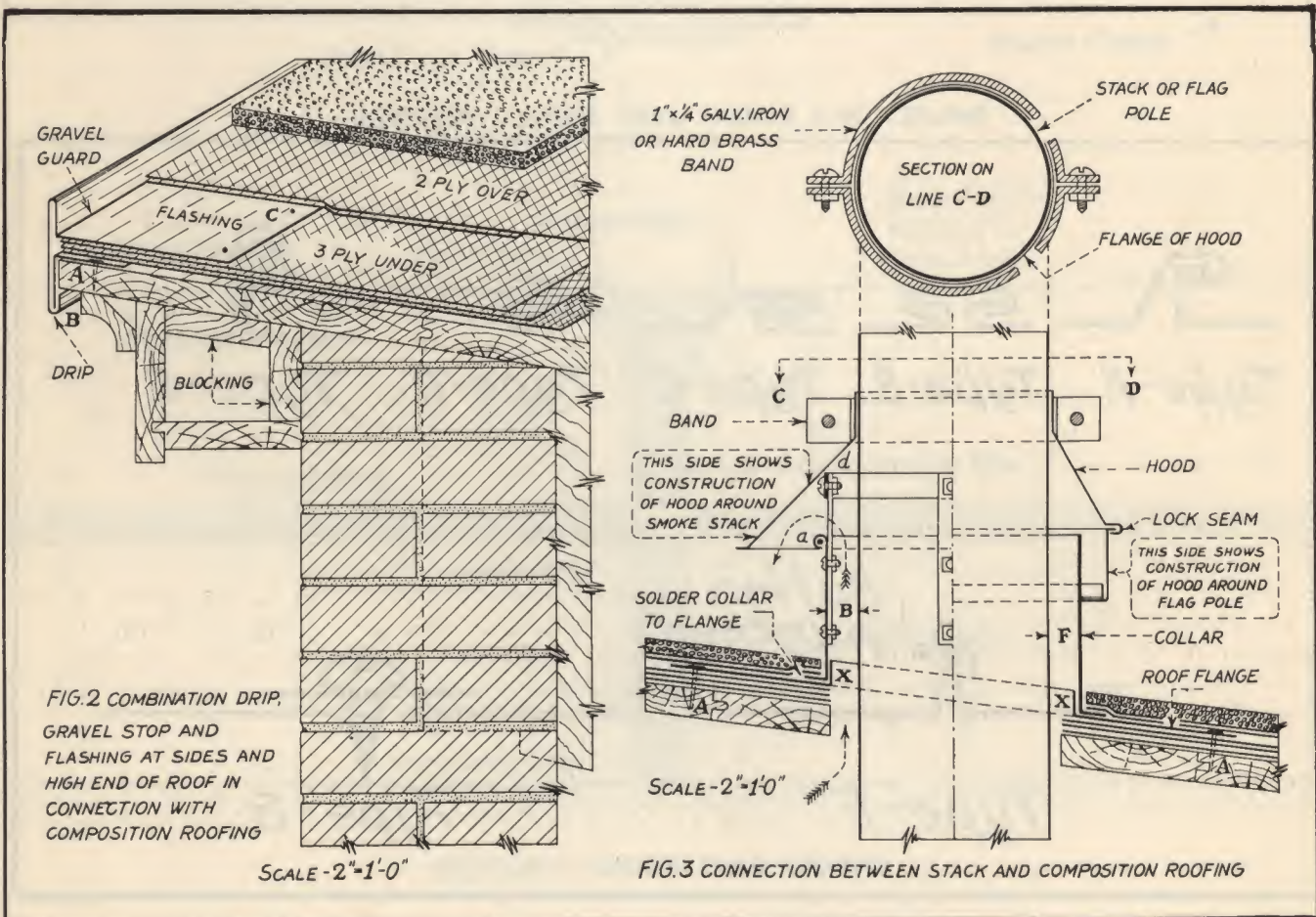
When the roof has no parapet walls, the high end and sides of the roof are protected and flashed as shown in Fig. 2 below, with a combination drip, gravel guard and roof flashing, formed in one piece.

Before any felt is laid, an angle strip is nailed along the sides and high end of the roof as shown by A. The three layers of felt are then applied and over this the flashing is placed hooked to the drip at B and nailed along the edge at C through the felt. When a stack or flag pole extends through the roof, the method of flashing and allowing for ventilation and vibration is clearly shown in Fig. 3. This illustration shows at the right the method which is used when the flashing is placed around the flag pole and at the left the method employed when the flashing is placed around a smoke stack. In either case, the flashings, collars and hoods are made in two halves after the pole or stack is in place.

After the lower plies of felt are cemented and

the pole or stack is in place, the roof flange and collar are set. At least 1 in. space is allowed, as at F, for vibration of the pole, as shown at the right and at least 2 in., as at B, to allow for ventilation as well as for vibration of the stack as indicated by arrows at the left.

In making the joint between the collar and the roof flange, the edges are flanged as indicated by X-X riveted and soldered. The roof flange extends out on the roof not less than 6 in. and is closely nailed through the felt to the sheathing at A-A. Note the construction of the hood around the flag pole at the right and also the different construction of the hood around the smoke stack at the left, where a wired edge is placed around the collar at a and to this collar four braces are bolted with a band iron ring around the top as shown at d which gives a rigid support for the hood. The hood in both cases is secured by two semi-circular bands bolted together as shown in the section on the line C-D.



DRAWING
NUMBER 21

GUTTER LININGS AND FLASHINGS AT
COMPOSITION ROOFING

Flashings Used in Connection with Composition Roofing

Drawing No. 22

Four methods of applying flashings required in connection with composition roofing are presented in Drawing No. 22.

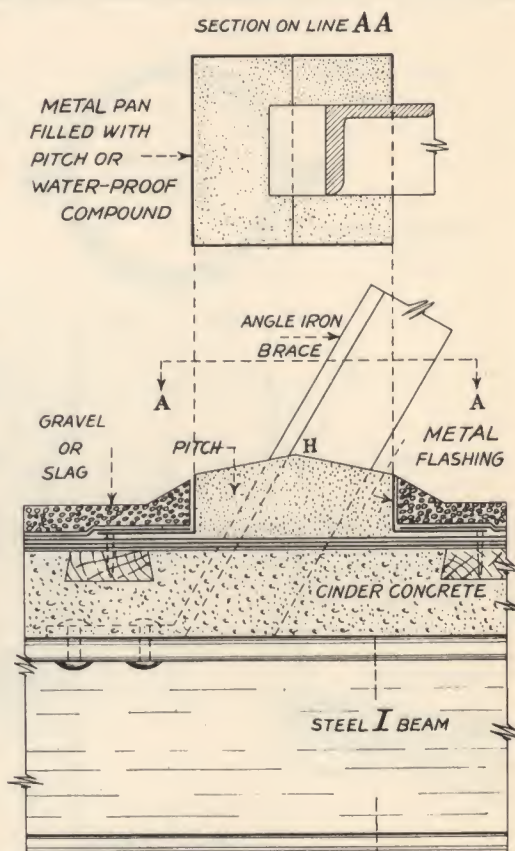
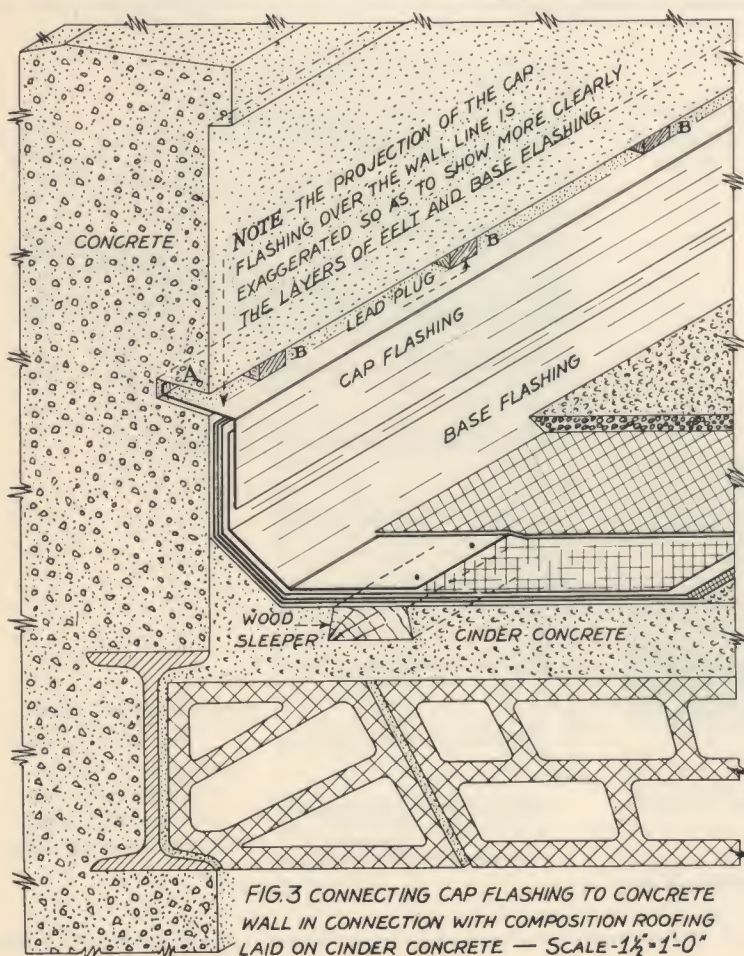
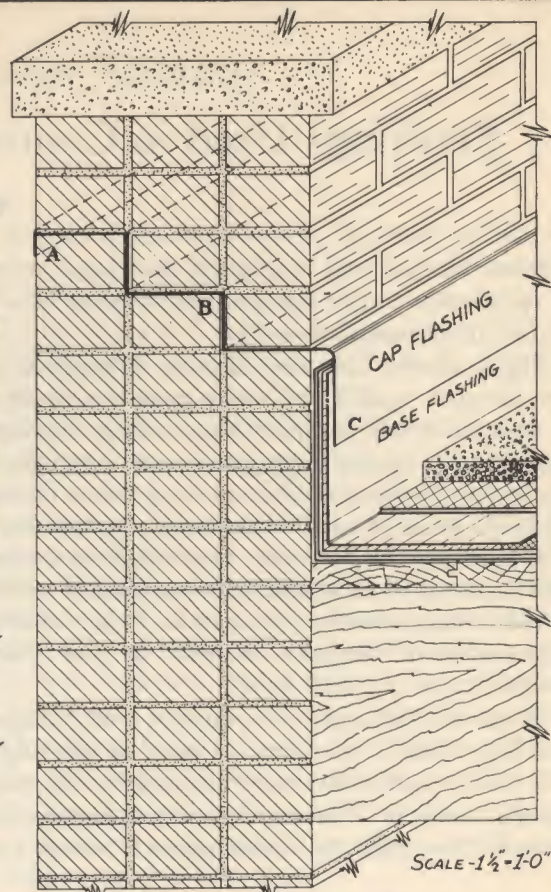
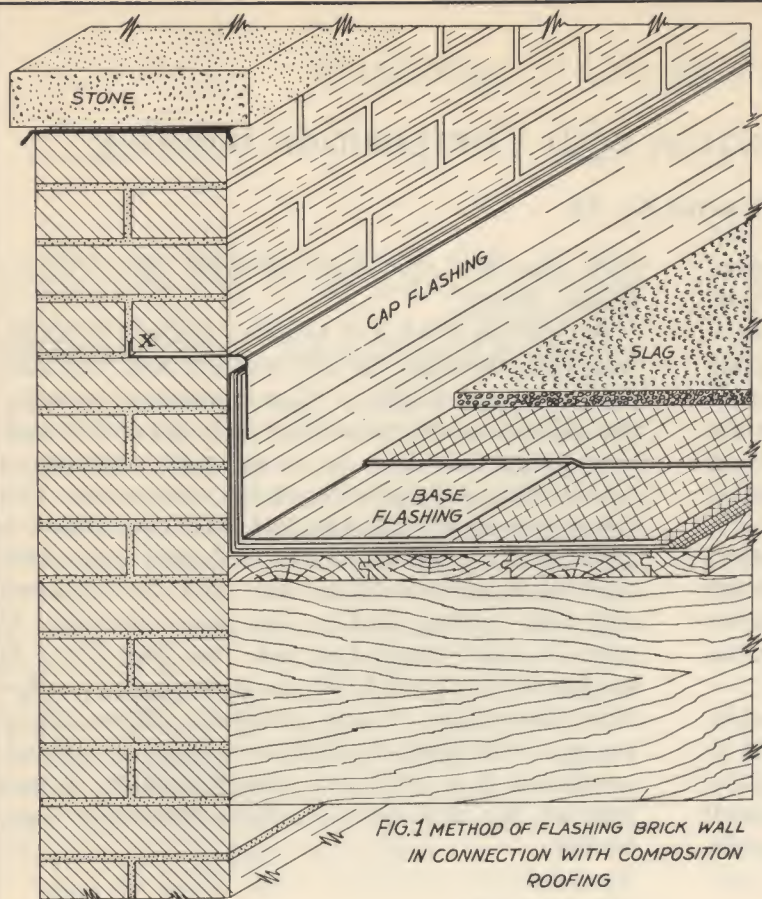
Fig. 1 shows how the flashing is applied when the parapet wall is of brick and the main roof is covered with composition roofing. After the wall is built to the required height over the roof line, a cap flashing is laid, an edge turned up at *X*, which is built in as the masonry progresses.

Sometimes the architect specifies that the entire wall be covered to prevent the seeping of moisture to the inside, which is done as in Fig. 2 where the cap and wall flashing is bent in one piece as shown from *A* to *B* to *C*.

To apply flashing to a concrete wall a reglet *A*, not less than 2 in. deep, is cast at an angle in the wall in which the cap flashing is inserted, as shown in Fig. 3. The cap flashing is secured about 8 or 10 in. apart with lead plugs *B* about 1½ in.

wide and then the reglet is filled with roofers' elastic cement.

Sometimes a strut or brace of channel or angle iron cuts through the composition and concrete roof, as shown in Fig. 4. Care is required to make the intersection between the brace and roof, water and damp-proof and also to allow for expansion, contraction and vibration of the steel brace. The lower layers of felt are laid and over these a flashing is placed, as shown, to form a pan. This flashing is secured to the roof and the top layer and slag roofing laid in the usual manner. If pitch is used to fill the pan, the steel brace is heated with a blow torch to secure proper adhesion, especially in cold weather. When filling the pan with pitch or other waterproof compound, a ridge at *H* is formed to shed the water. A section on the line *A-A* is shown above the illustration.



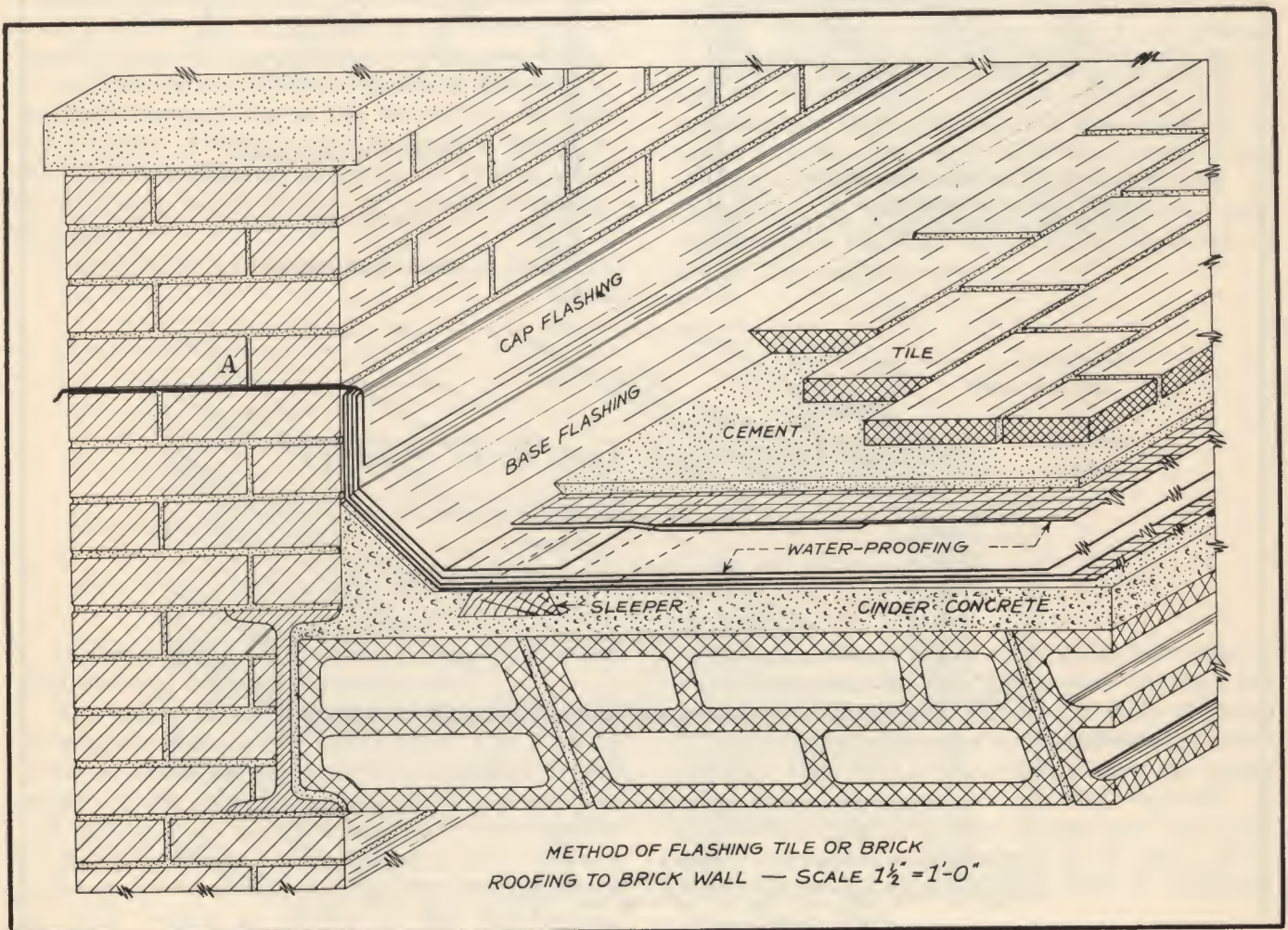
Flashing Used at Tile Deck Roofing

Drawing No. 24

In Drawing 24 is shown the method of flashing tile or brick roofing to a brick wall.

The cap flashing A is built into the wall as a through wall flashing as the masonry progresses.

The base flashing is placed between the water-proofing and felt layers and is carried up—unlocked—behind the cap flashing.



DRAWING
NUMBER 24

FLASHING USED AT TILE DECK
ROOFING

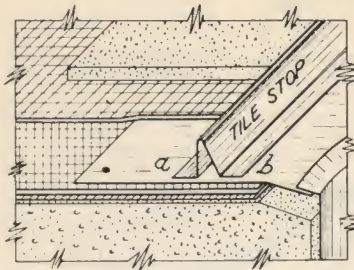


FIG-2 SHOWING SEPARATE
TILE STOP
SCALE - $1\frac{1}{2}''=1'-0''$

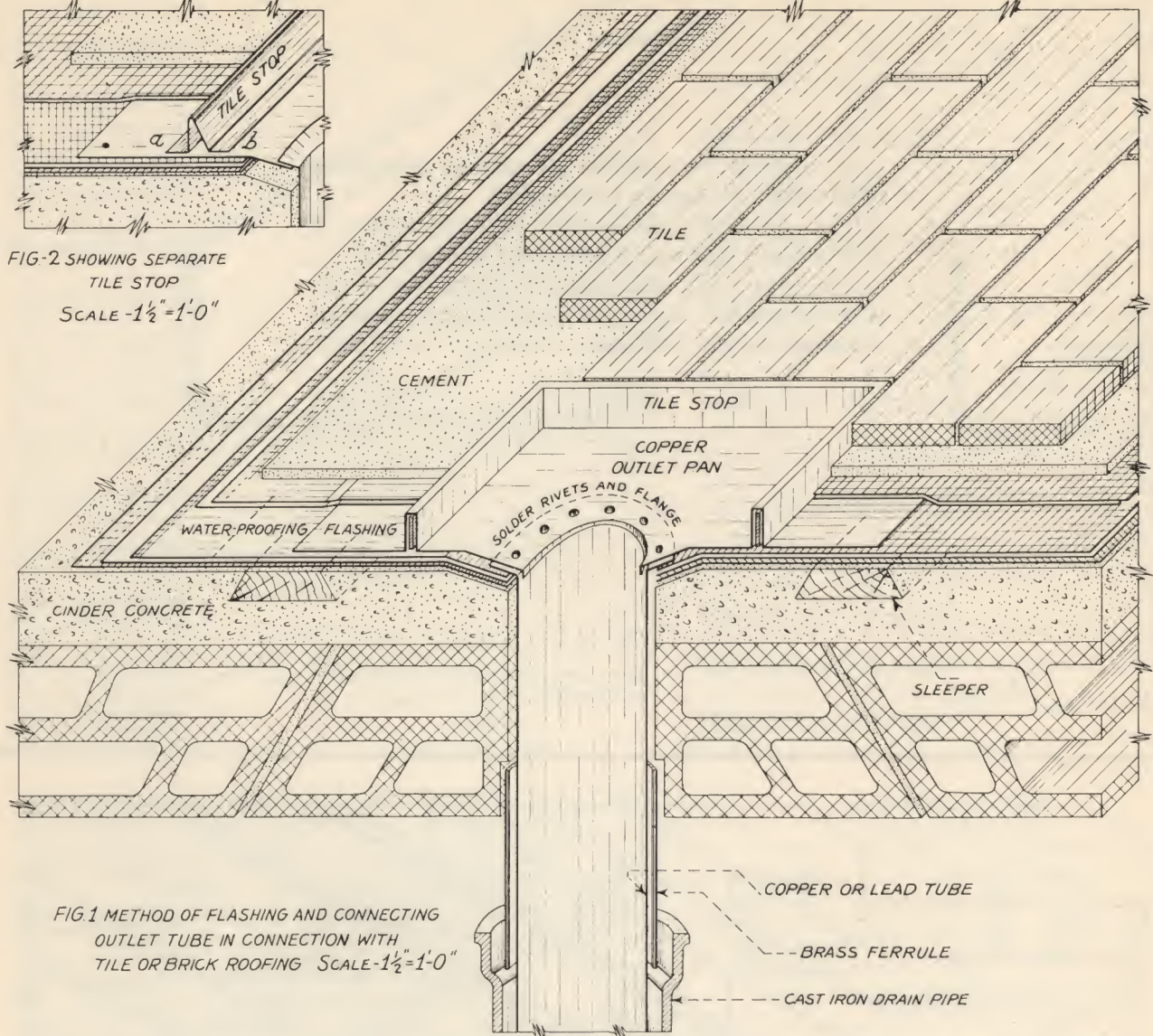


FIG.1 METHOD OF FLASHING AND CONNECTING
OUTLET TUBE IN CONNECTION WITH
TILE OR BRICK ROOFING SCALE - $1\frac{1}{2}''=1'-0''$

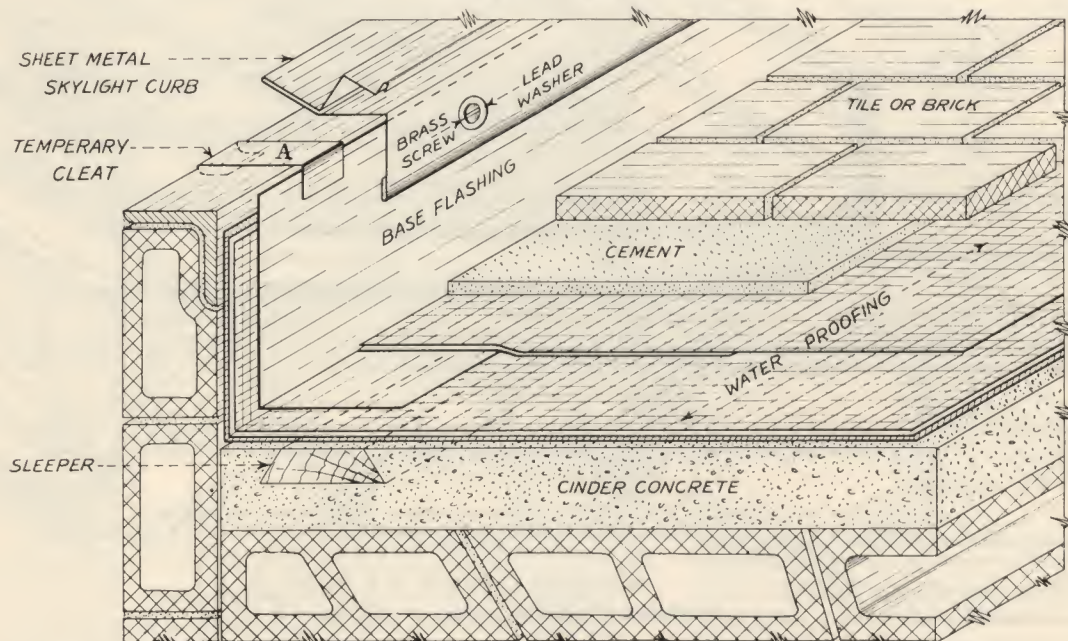


FIG.3 FLASHING SKYLIGHT FRAME IN CONNECTION WITH TILE OR BRICK ROOFING SCALE - $1\frac{1}{2}''=1'-0''$

Flashing Used at Tile Deck Roofing

Drawing No. 25

Drawing No. 25 shows the methods of flashing roof outlets and skylights or other structures projecting above the roof line when tile roofing is used for flat roof covering.

The outlet connection to an inside drain pipe is presented in Fig. 1. When the cinder concrete fill is being graded to the outlet, the cement is slightly beveled around the outlet, as shown, to allow free movement of the rain water. Sleepers are inserted in the concrete for nailing the flashing. After the lower plies of the waterproofing are thoroughly cemented with hot pitch, the combination flashing, tile stop pan and tube is nailed in position, connecting to the inside drain. Note that the tube is flanged and riveted to the underside of the pan and then thoroughly sweated with solder to avoid water flowing against the seam. The tube extends in the cast iron pipe not less than 6 in. If the outlet tube is of copper, it is heavily coated with asphaltum before connecting to the iron pipe. A brass ferrule is soldered to the tube for caulking to the iron drain pipe by the plumber. A band of iron or brass is placed in the stop for stiffening purposes. If iron is used, it receives a heavy coating of asphaltum before insertion.

Over the tube a proper size strainer is placed to

prevent stoppage of the iron drain. Over the flashing the upper layers of waterproofing are cemented, then tile is laid in cement in the usual manner and the joints filled with cement.

Another type of tile stop is shown in Fig. 2. Here the flashing is one piece of metal of the required size and over this the tile stop is tacked with solder at *a* and *b* to allow the seepage of any water from the roof to enter the outlet pan.

Fig. 3 shows the flashing against angle iron skylight or other frame. The method of flashing shown is applicable to any curb construction when the flat roof is covered with tile. When the curb construction is of angle iron, the angle iron coming in contact with metal receives a heavy coat of asphaltum before applying the sheets. The base flashing is set over the lower layers of waterproofing and extends up to the top of the iron angle. Temporary cleats, shown by *A*, are hooked to the iron angle and turned down over the flashing but not soldered. After the skylight curb is set, holes are tapped in the angle iron about 36 in. apart and the curb secured to the frame, brass machine screws and lead washers being used. If the outside of the curb is wood sheathed, brass wood screws and lead washers are employed to secure the skylight curb.

Gravel Stop and Approved Strainer

Drawing No. 26

In Drawing No. 26 is shown an approved outlet and strainer for slag surfaced roofs.

The gravel stop presented in Fig. 1 is placed around the edge of the outlet tube. The flashing piece and tube are constructed as follows: In the center of the flashing plate a circle representing the diameter of the tube is struck, and another circle $\frac{1}{2}$ in. less in radius is then struck from the same center to allow for a flange to be turned up at right angles as shown in the illustration.

Before the tube is rolled up a $\frac{1}{2}$ -in. hem edge is turned on one end and then passed through the rolls, care being taken to insert a strip of metal to prevent the hem edge from being crushed when rolling. This tube is then slipped over the single edge on the flashing piece and well soldered. A perforated cylinder is fitted snugly into the outlet and a regulation wire strainer set in place, all as indicated in the drawing. The tube is connected to an inside drain.

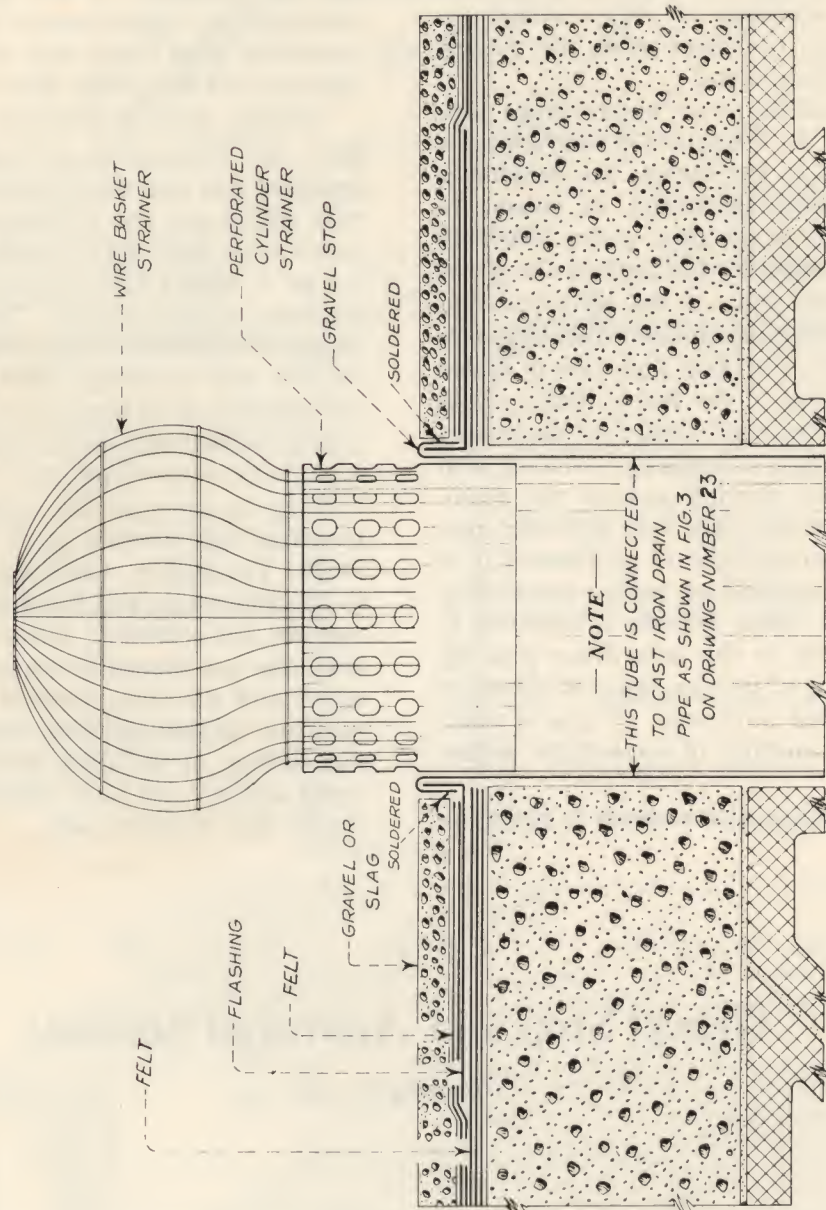


FIG 1 METHOD OF CONSTRUCTING GRAVEL STOP AROUND EXTREME EDGE OF OUTLET TUBE WITH APPROVED STRAINERS

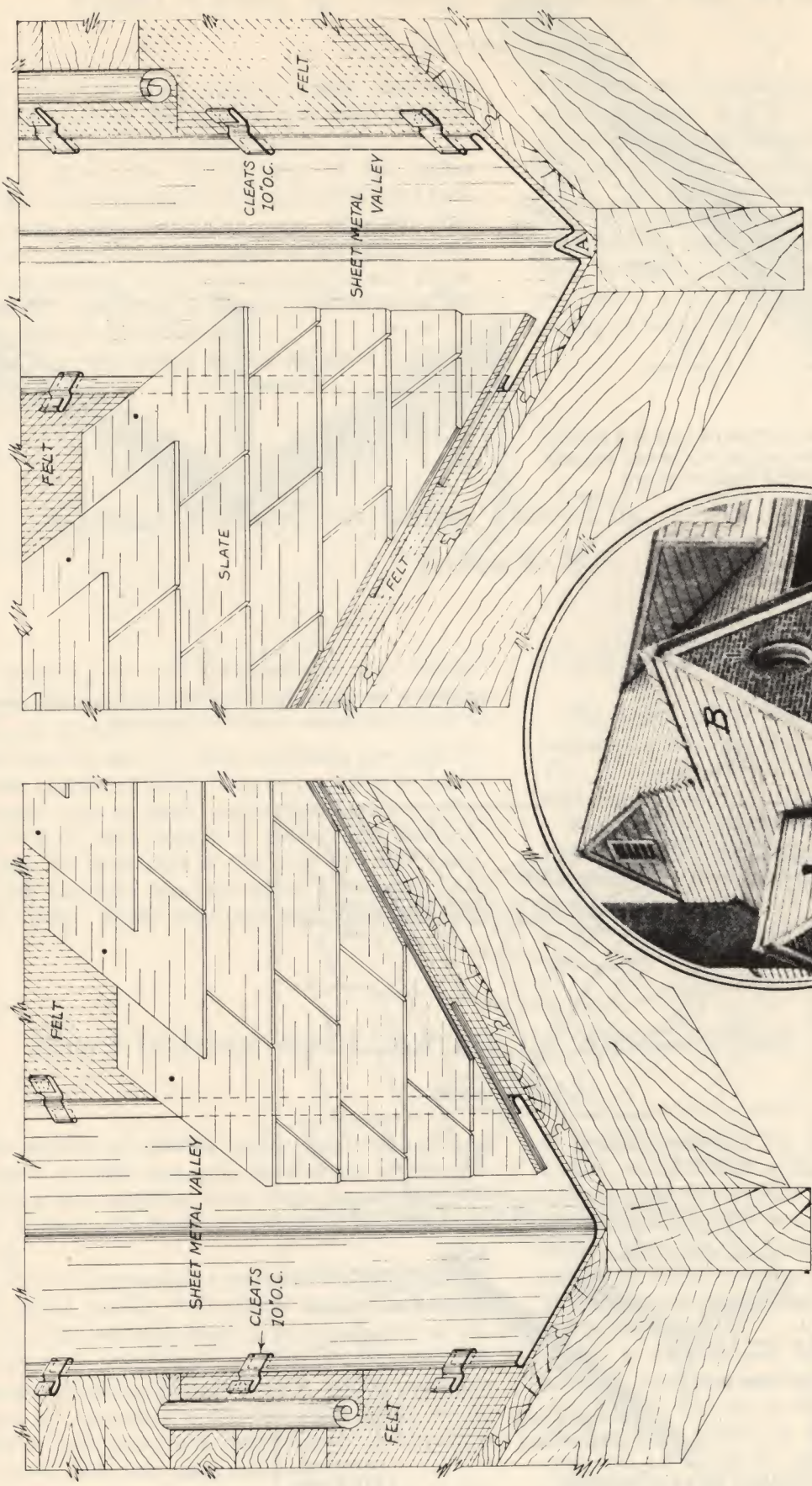


FIG. 1 CONSTRUCTION OF VALLEY
FLASHING WHEN ROOF SLOPES
HAVE THE SAME PITCH AND BOTH
ROOFS HAVE ABOUT THE SAME AREA
VALLEY SECURED WITH CLEATS
— SCALE $1\frac{1}{2}''=1'-0''$ —

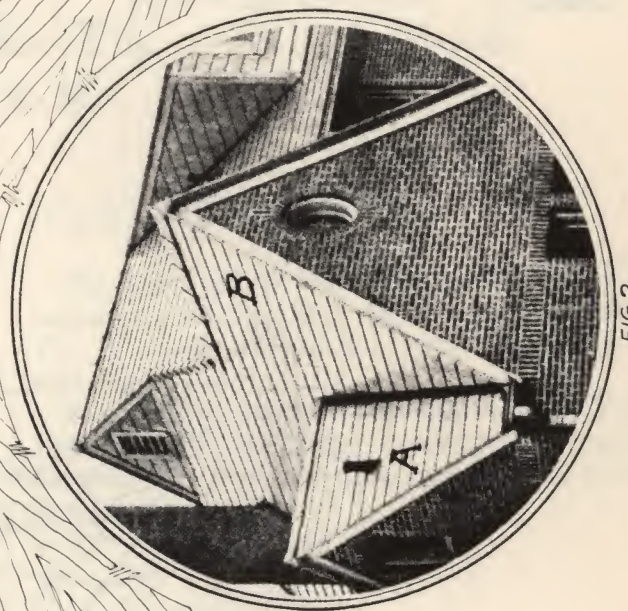
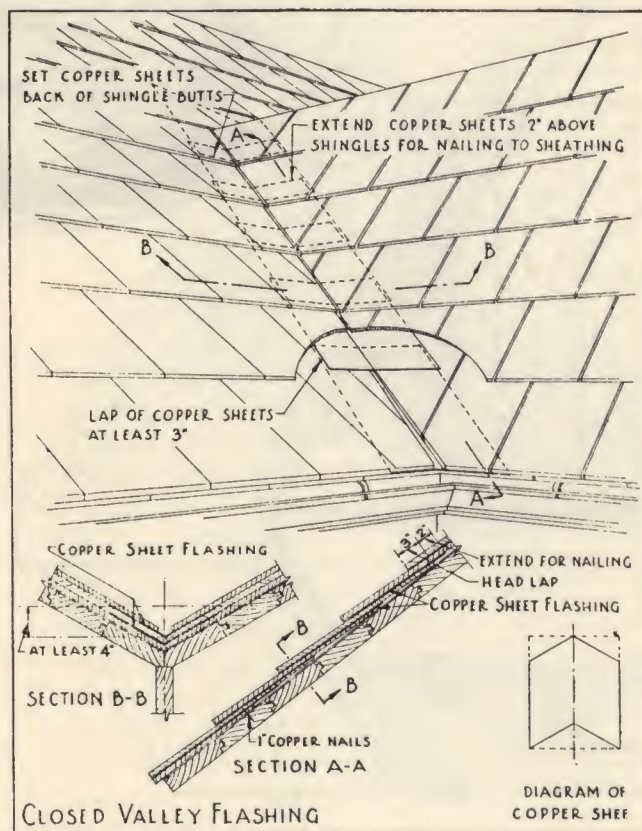
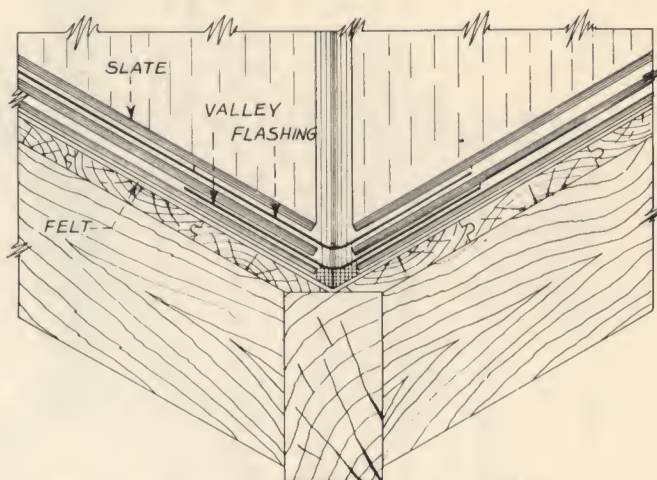
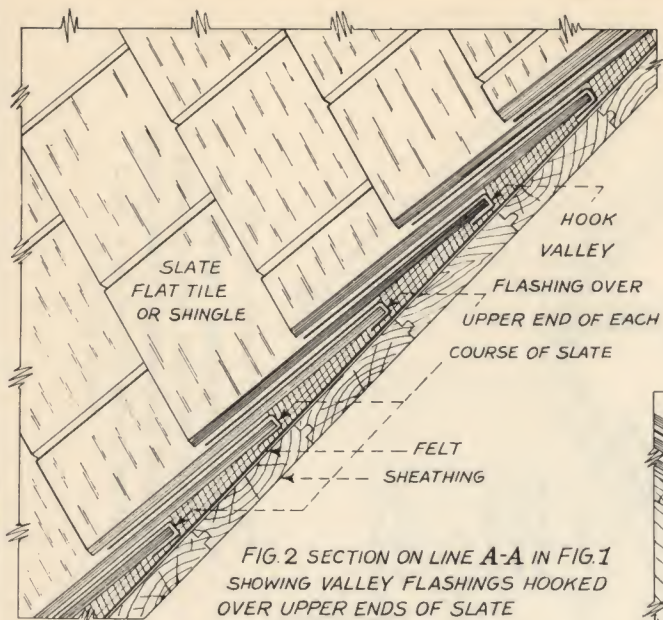


FIG. 2

FIG. 3 CONSTRUCTION OF VALLEY
FLASHING WHEN ROOF SLOPES DO
NOT HAVE THE SAME PITCH OR WHEN
ONE ROOF DISCHARGES MORE WATER
THAN THE OTHER AS SHOWN IN FIG. 3
SCALE $1\frac{1}{2}''=1'-0''$



Open Valley on Shingle, Slate or Flat Tile Roofs

Drawing No. 29

Two types of open valleys which are used when the pitch of the roof is less than 8 in. in 12 in. are presented in Drawing No. 29.

Fig. 1 shows the construction of the valley when the roof slopes have the same pitch and both roofs have about the same area. Regular lock edges are turned at both sides of the sheet metal which is secured with cleats spaced about 10 in. on centers. The cross joints are not soldered but overlapped not less than 6 in.

When the roof slopes are of different pitch or

when one roof discharges more water than the other, as shown in Fig. 2, in which roof *B* has a larger area and a steeper pitch than roof *A*, an inverted *V* is formed in the valley, as shown in Fig. 3. This serves to break the force of the water from the larger roof and prevents it being forced above the top of the flashing on the opposite slope. Care is taken to place a wood core under the inverted *V* as at *A* to prevent crushing while the roofing is being laid.

Closed Valleys on Slate, Flat Tile or Shingle Roofs

Drawing No. 30

In Drawing No. 30 is presented the method employed when a closed valley is laid on a slate, flat tile or shingle roof.

The short pieces of valley flashings are laid in with the courses of slate, care being taken to hook the upper end of each valley flashing over the upper end of each course of slate. The flashing laps over on each side of the roof not less than 7 in. and has four top lugs about 1 in. wide and 1½ in. long. These lugs are bent over the top

of each course of slate as shown.

The length of the flashing is determined by the exposure to the weather. This is clearly shown in Fig. 2, which represents a section taken on the line *A-A* in Fig. 1.

A section, taken on the line *B-B* shown in Fig. 3, indicates how the valley flashings are inserted between the courses of slate, and needs no further description.

Hip Flashing and Covering on Slate or Flat Tile Roofs

Drawing No. 31

The method of making water-tight connections against a wooden hip pole by the use of shingle flashings and capping with sheet metal hip roll with aprons attached is indicated in Drawing No. 31.

In Fig. 1 is presented a perspective showing the sheet metal cornice, the gutter lining flashed up on the roof not less than 6 in. as shown at *X*. Note that the roof flashing *X* is carried over the wooden hip pole as indicated at *Y*, which prevents leakage at the corner of the hip. The under eaves course is laid first, care being taken to have the nail above the lock edge as shown.

Shingle flashing 1 is then laid, the top of the flashing being hooked over the top of the eaves slate as shown at *a*. The first course is then laid over the flashing and then the flashing marked 2

is hooked over the top of the first course at *b*, and so on as shown in the illustration.

Note that the shingle flashings numbered 3, 4 and 5 hook over the courses at *c*, *d* and *e*, respectively. Hooking the flashings over the top of each course of slate prevents them from sliding down. The shingle flashings are never nailed against the hip pole.

Fig. 2, an enlarged detail, shows more clearly how the flashings are secured to the upper ends of the slate, flat tile or shingles. Over these shingle flashings, shown in Fig. 1, a sheet metal hip roll with an apron on each side to cover the nail heads of the top course of slate is secured to the wooden hip pole with clamps as shown in the enlarged detail in Fig. 3, which explains itself.

FIG. 2 ENLARGED
SECTIONAL VIEW
SHOWING HOW
FLASHING IS
HOOKED ON
UPPER END
OF SLATE,
FLAT TILE
OR SHINGLE

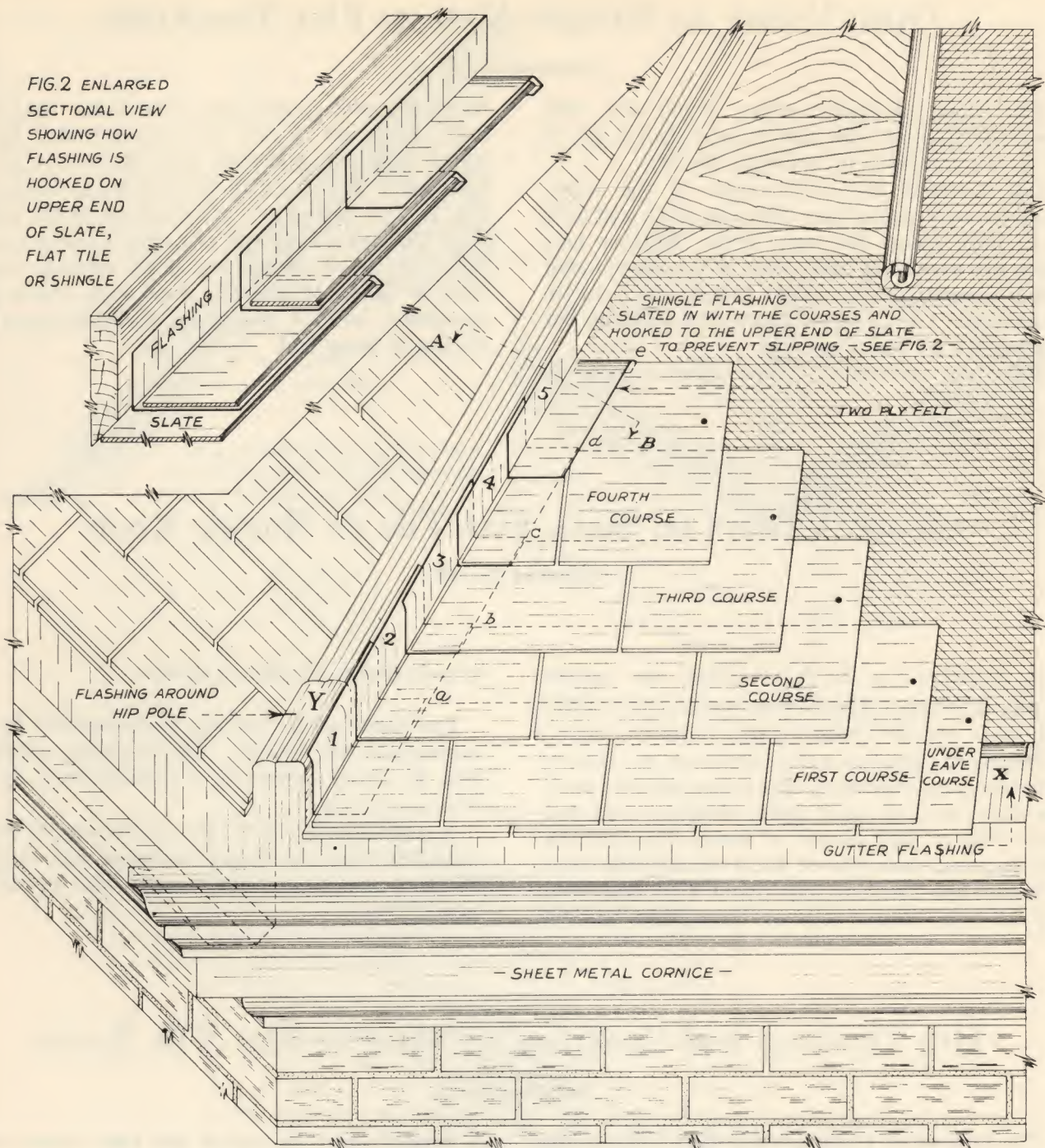


FIG. 1 METHOD OF USING SHINGLE FLASHING AT HIP IN CONNECTION WITH SLATE, FLAT TILE AND SHINGLE ROOFING
SCALE - 1"=1'-0"

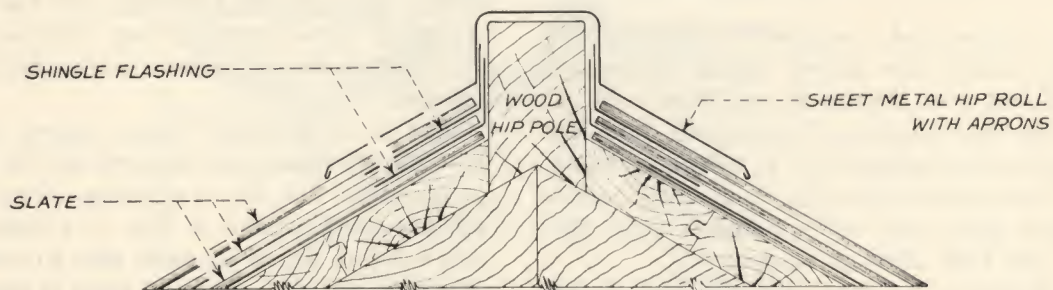


FIG. 3 SECTION ON LINE A-B IN FIG. 1 SHOWING SHEET METAL HIP ROLL
SCALE - 3"=1'-0"

DRAWING
NUMBER 31

HIP FLASHING AND COVERING ON SLATE
OR FLAT TILE ROOFS

Hip and Ridge Flashing for Slate or Flat Tile Roofs

Drawing No. 34

The methods of slating hips and ridges with and without flashings are presented in Drawing No. 34. This drawing also shows how flashings are inserted over the nail heads to prevent leakage, when hips or ridges of pitched roofs are covered with slate, flat tile or shingles in place of a sheet metal ridge roll or saddle.

As shown in the upper part of Fig. 1, wood strips are first nailed along the hip and ridge to which the hip or ridge slates are secured. When the gutter is lined, the sheet metal is turned up the roof not less than 6 in. as shown and is carried over the wood strips at the hips, making a continuous flashing at the eaves from *A* to *B* to *C*.

The roof is then covered in the usual manner, as shown up to *D*. Slates used for hip covering are laid to cover the nail heads at *D* at least 4 in. They are nailed to the wood strips, care being taken to miter them where they intersect as at *B*. The nail heads are covered with flashing, the upper end of the flashing being hooked over the top edge of the slate, as shown at *a* and *b*. When the flashing is hooked to the top of the slate, it is necessary to allow for only two lugs about 1 in. wide, as shown by *a* and *b* in Fig. 2.

Fig. 3 shows a finished view of a hip covered with slate.

Chimney and Saddle Flashing for Slate or Flat Tile Roofs

Drawing No. 35

Drawing No. 35 shows how chimneys and saddles are flashed when the roof covering is either slate, flat tile or shingles.

The flashing of the front and side of a chimney are presented in Fig. 1. After the course *S* is laid, the base flashing and shingle flashing *A* is set in position, a hem edge being placed along the bottom of the base flashing to insure stiffness as shown by the broken view marked *B*. Over the flashing *A*, course *T* is laid, a separate shingle flashing being used with each course. When the course *V* is reached, the saddle flashing behind the chimney is laid to overlap the slate course *V*. Care is taken to hook each shingle flashing to the upper end of the slate, as shown in Fig. 2 on Drawing No. 31.

The base and shingle flashings are cap flashed, as shown, the upper flange entering the brick joint not less than 4-in., secured with lead plugs 1 in. wide and placed 8 in. on centers and

the joints filled out with roofers' elastic cement.

When possible to do so, the cap flashing is built in the wall as the masonry progresses. Where the saddle flashing is turned around over the shingle flashing in the broken view at *C* and the corner at the lower end *A* of the chimney, the joints are well soldered.

Fig. 2 shows how the side of the chimney and saddle behind the chimney are flashed. A detailed section on the line *A-B* is given in the lower right hand corner which shows the cap flashing overlapping the upturned flashing of the saddle. The saddle is carried up under the roof covering as shown in the broken view at *C* with a lock edge turned. The broken view at *D* shows the continuation of the base flashing with the shingle flashings at the side of the chimney. Where a chimney intersects the ridge of a roof, it is flashed similar to that shown in Fig. 1 on Drawing No. 33.

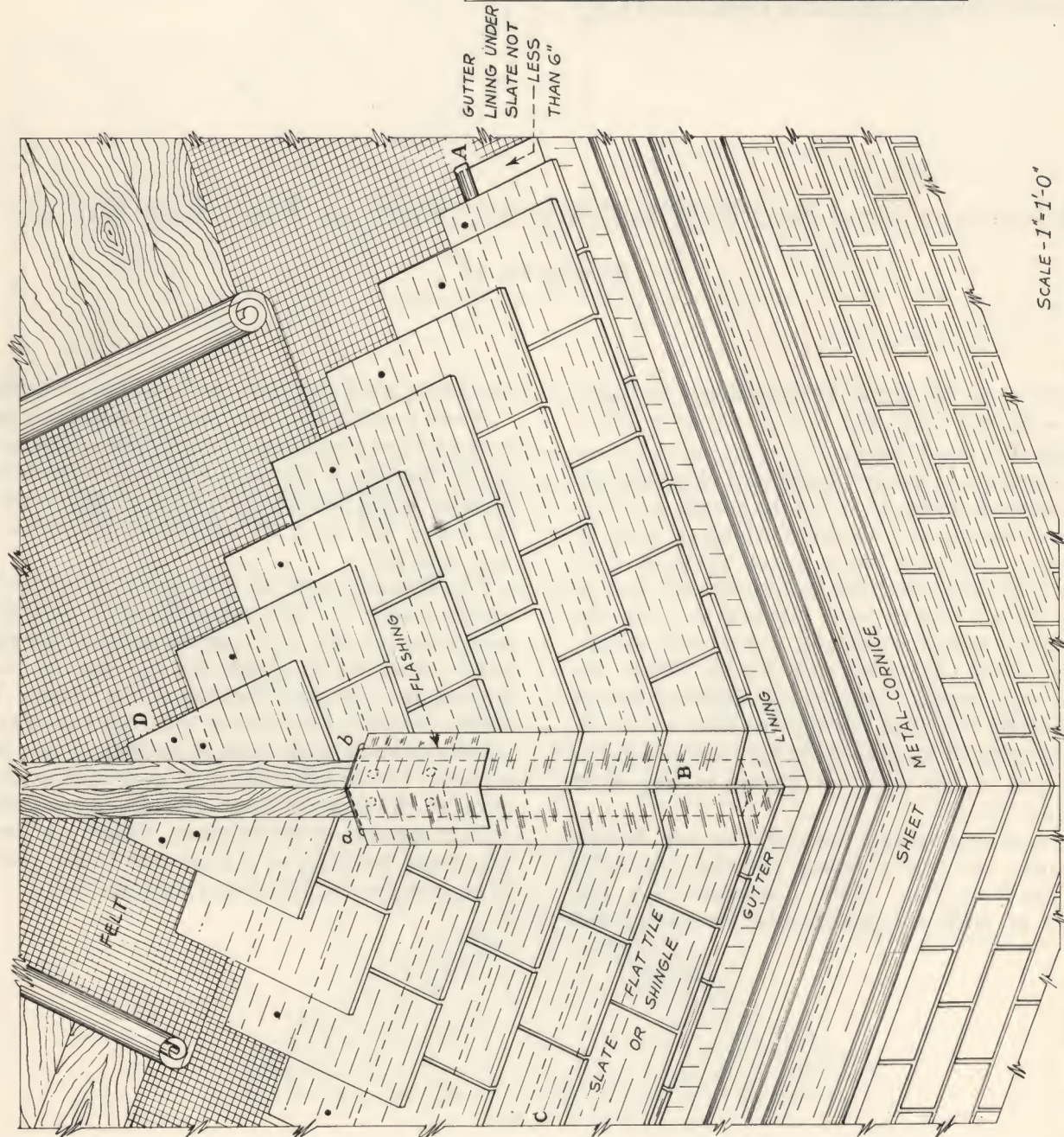


FIG. 1 METHOD OF APPLYING FLASHING TO HIP COVERED WITH SLATE - ALSO APPLICABLE TO RIDGE

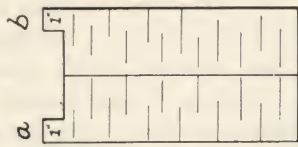


FIG. 2 DETAIL OF HIP FLASHING

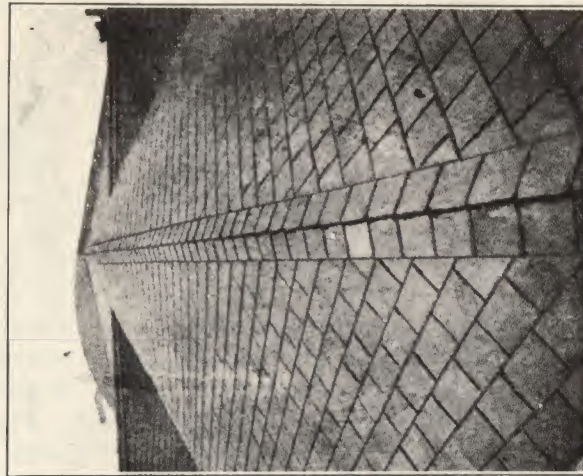


FIG. 3 FINISHED VIEW OF HIP COVERED WITH SLATE

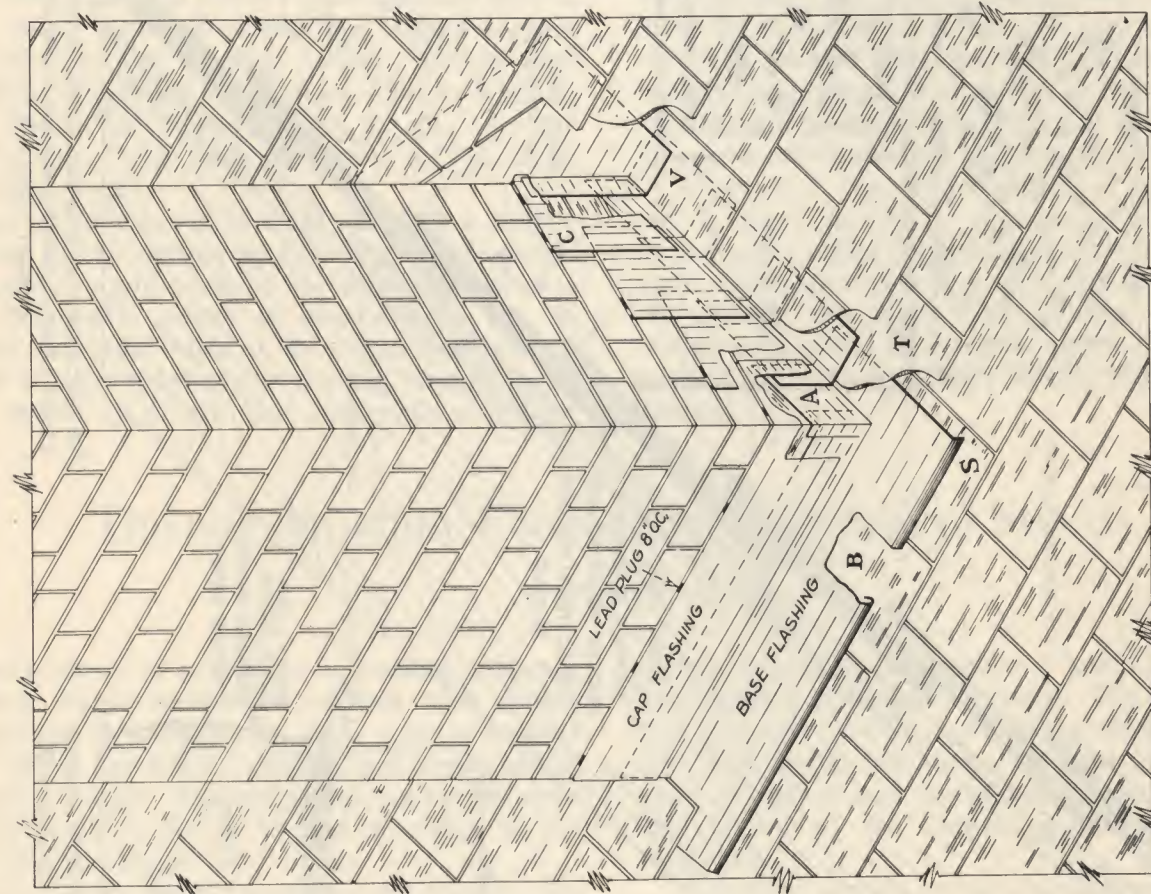


FIG. 1 PERSPECTIVE VIEW SHOWING FLASHING AT FRONT AND SIDE OF CHIMNEY FOR SLATE, FLAT TILE AND SHINGLE ROOFS

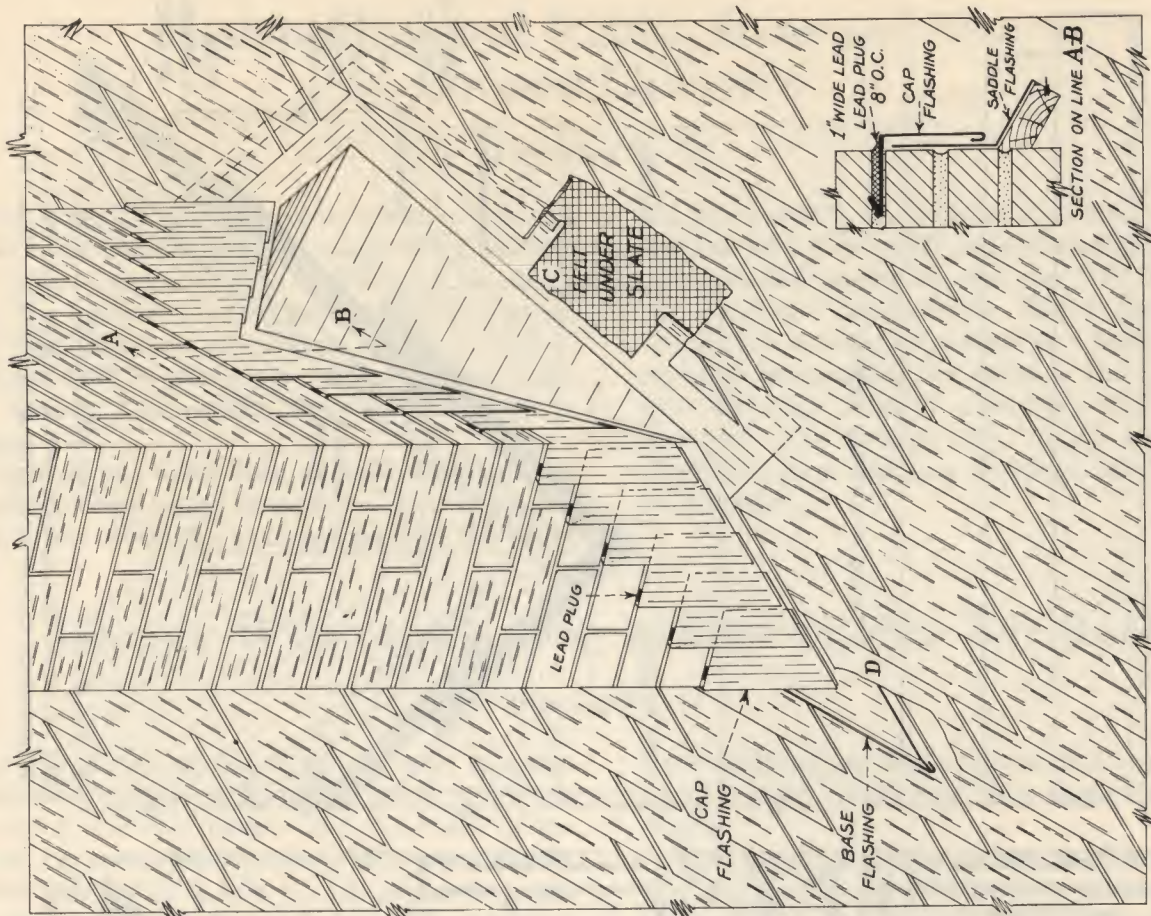
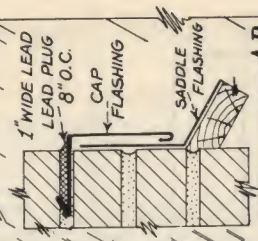


FIG. 2 PERSPECTIVE VIEW SHOWING FLASHING AT SIDE AND REAR OF CHIMNEY FOR SLATE, FLAT TILE AND SHINGLE ROOFS



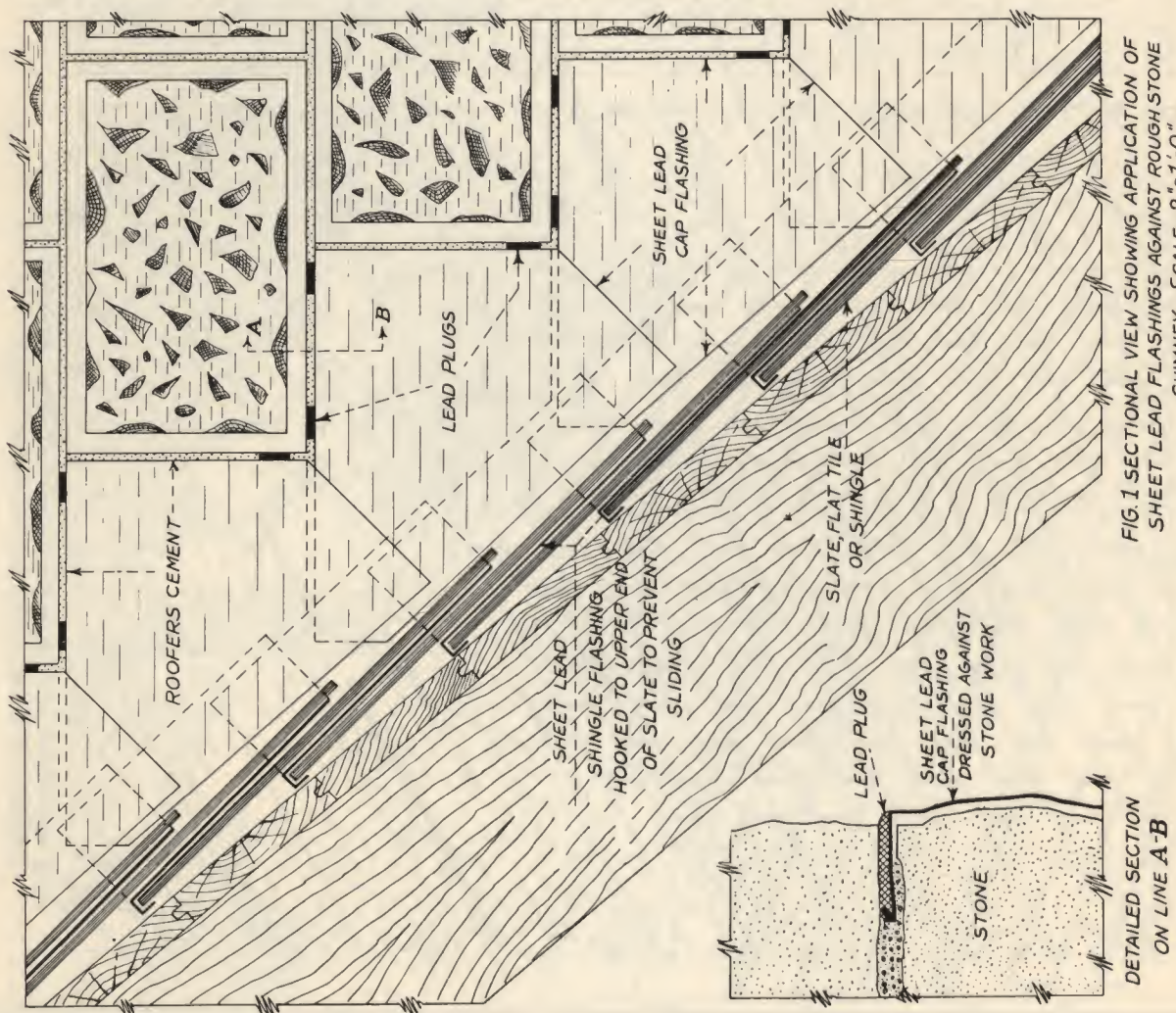


FIG. 1 SECTIONAL VIEW SHOWING APPLICATION OF SHEET LEAD FLASHINGS AGAINST ROUGH STONE CHIMNEY - SCALE 2"=1'-0"

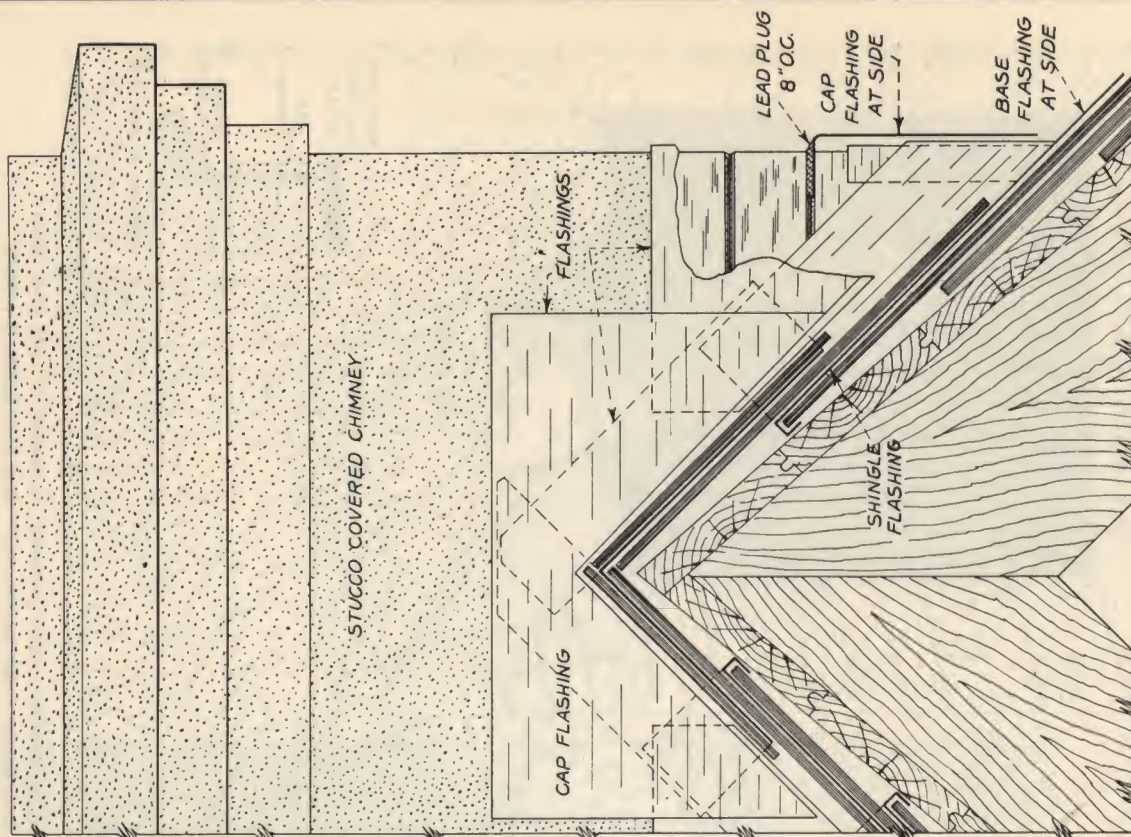


FIG. 2 SECTIONAL VIEW SHOWING APPLICATION OF FLASHINGS TO ROUGH BRICK CHIMNEY COVERED WITH STUCCO - SCALE 2"=1'-0"

Flashings Against Rubble Stone and Stucco Covered Chimneys

Drawing No. 36

Two types of chimney construction—one of rubble stone and the other of rough brick covered with stucco—are presented in Drawing No. 36.

On the chimney constructed of rubble stone, sheet lead flashings are used as shown in Fig. 1. As sheet lead is pliable, it can be dressed with ease against the rough stone surface with a mallet.

Note that the sheet lead shingle flashings are hooked over the upper end of the slate as shown and the cap flashings are wedged into the joint

not less than 1½ in., plugged with lead every 8 in. and the joint filled with roofers' elastic cement.

A detailed section on the line A-B is given in the lower left hand corner. Fig. 2 shows a sectional view and part elevation of a stucco covered chimney intersecting the ridge of the roof. Note how the slate ridge is completed and flashings inserted. The broken view at the lower right shows the base and cap flashings at the side of the chimney.

Dormer Window Flashing at Slate or Flat Tile Roofs

Drawing No. 37

Fig 1 in Drawing No. 37 shows how flashings are applied against a dormer window when the main roof, the roof cheeks and the front of the dormer are covered with slate, flat tile or shingles.

After course *E* is laid on the main roof, the base flashing *F* and shingle flashing *H* are placed, care being taken to solder the lapped corners shown. Over this flashing, course *I* is laid, then the shingle flashing *J*, and so on. Care is taken to hook the shingle flashings *I*, *J*, *K*, etc., over the upper end of the slate as shown in Fig. 2 on Drawing No. 31.

The upper courses of slate slip into a groove formed at the bottom of the cornice, as shown. To cover the nail heads of the finishing course, a cap flashing is placed as described in Fig. 2. Where the slates miter at the corner between the cheek and the front of the dormer, shingle flashings shown by *N* are used over each course of

slate at the corner and a similar flashing as shown at *O* is used where the slate abuts the window frame.

Fig. 2 gives a detail through the cornice on the line A-B in Fig. 1, and shows the flashing extending up under the slate on the dormer roof. Note how the cap flashing below the cornice is bent, covering the nail heads to avoid leakage. A slight corrugation is formed as shown so that when the cap flashing is pressed between the slate and the metal, it will bind and prevent slipping.

A section on the line C-D in Fig. 1 through the sill is shown in Fig. 3. Note how the metal sill is covered, joining the base flashing with a locked drip, which allows for free movement of the metal. To prevent the apron from sliding, cleats are nailed at *A* every 10 or 12 in. and the lower end turned over the hem edge of the apron at the bottom.

Dormer Window Flashing with Cheeks of Stucco

Drawing No. 38

The methods of procedure in flashing a dormer window whose cheeks are covered with stucco, regardless of whether the main roof is covered with slate, flat tile or shingle, are presented in Drawing No. 38. The method of laying the shingle flashings is similar to that described in the preceding drawings.

Provision is made to receive and support the stucco finish at the lower line of the cheeks of the dormer by nailing a projecting board to the

dormer cheeks as indicated at *X* and over this the cap flashing is applied as shown. Two ply tarred felt is lapped over the cap flashing, then the metal lath and finally the stucco, finished even at the base as shown, and the stucco pressed well into the groove at the bottom of the cornice as indicated.

A detailed section on the line A-B is shown in Fig. 2, and is self-explanatory. Another section on the line C-D in Fig. 1 is shown in Fig. 3.

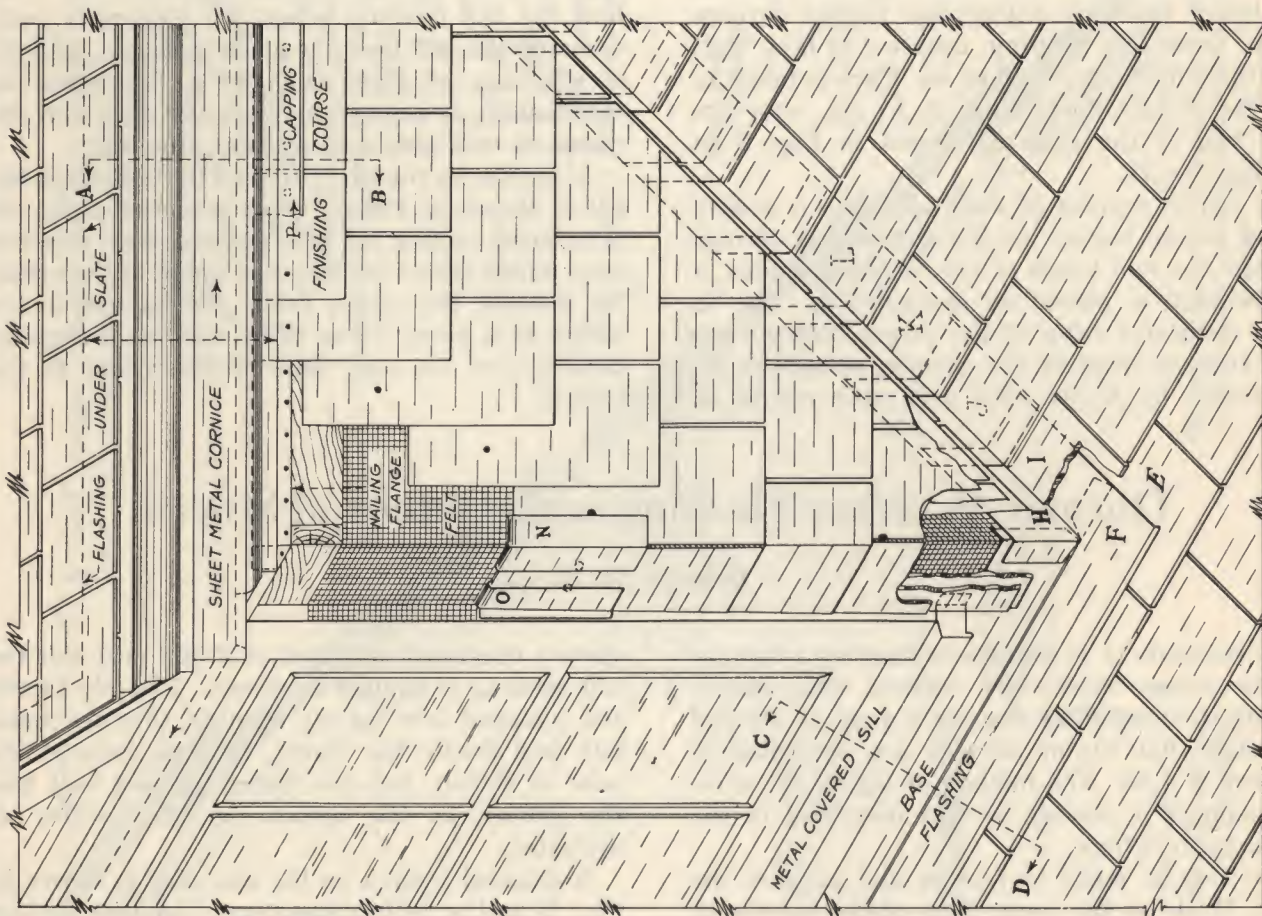


FIG. 1 FLASHING DORMER WINDOW WHEN CHEEKS, FRONT AND ROOFS ARE COVERED WITH EITHER SLATE FLAT TILE OR SHINGLE

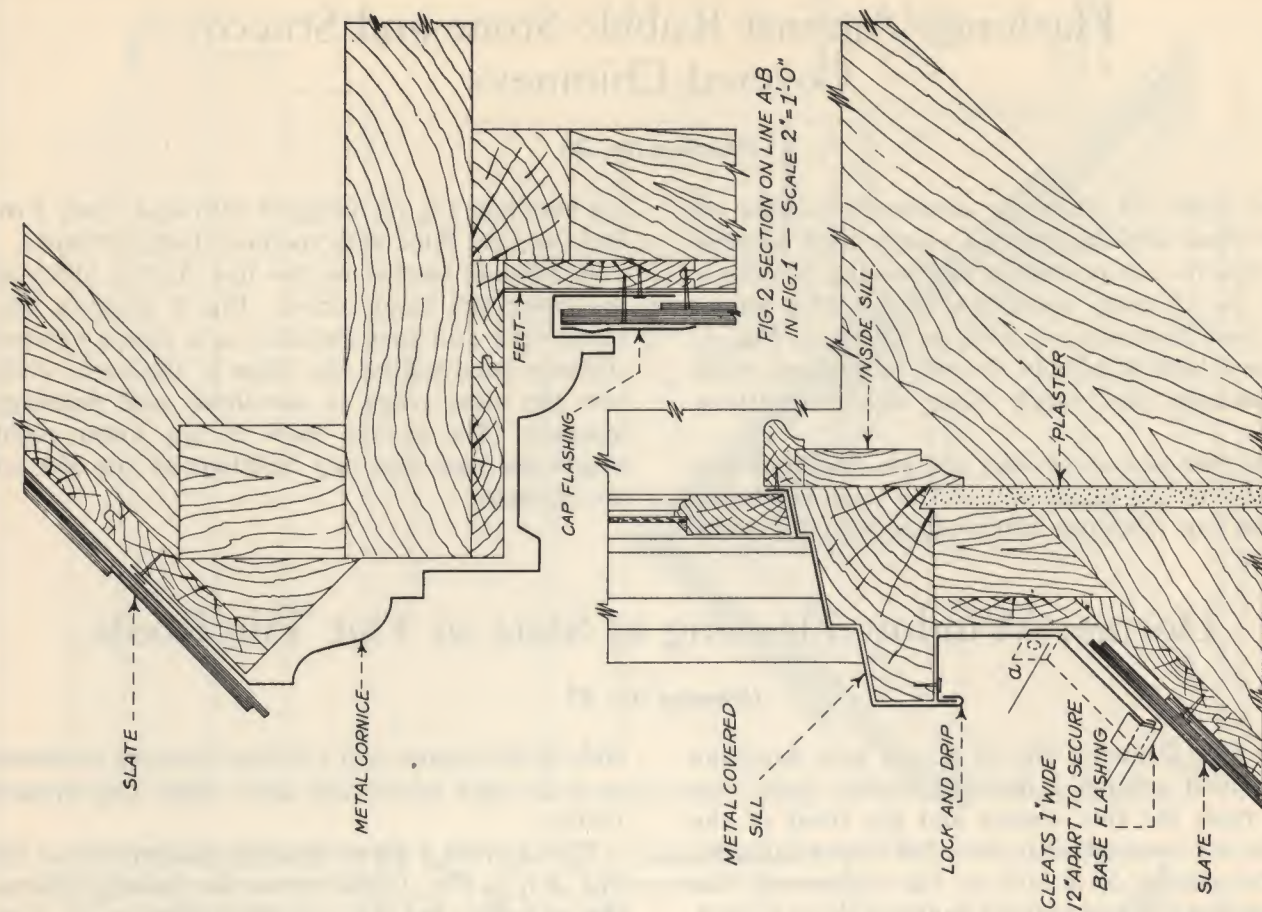


FIG. 2 SECTION ON LINE A-B IN FIG. 1 — SCALE 2"=1'-0"

FIG. 3 SECTION ON LINE C-D IN FIG. 1 SCALE - 2"=1'-0"

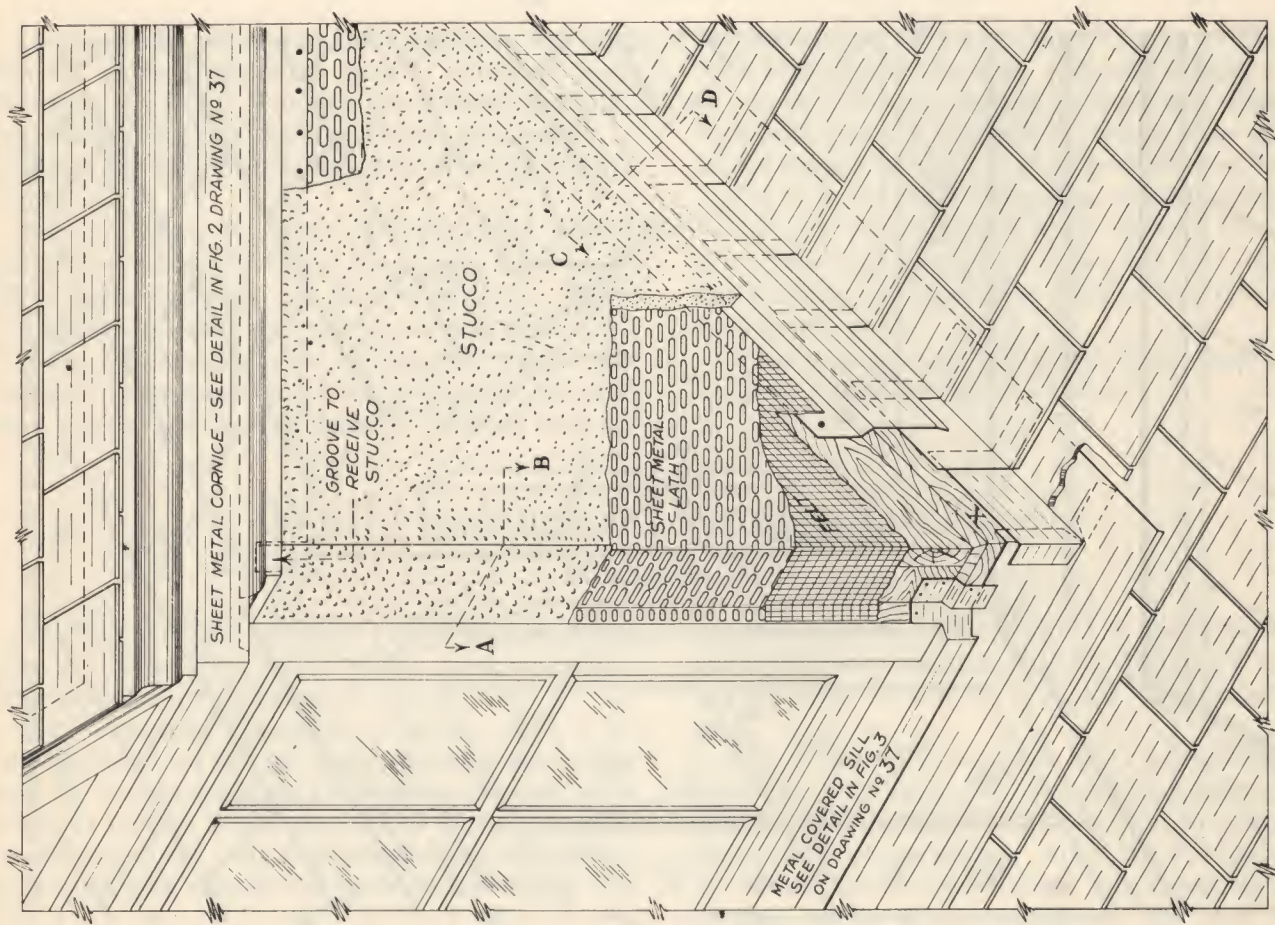


FIG. 1 FLASHING DORMER WINDOW WHEN CHEEKS ARE COVERED WITH STUCCO

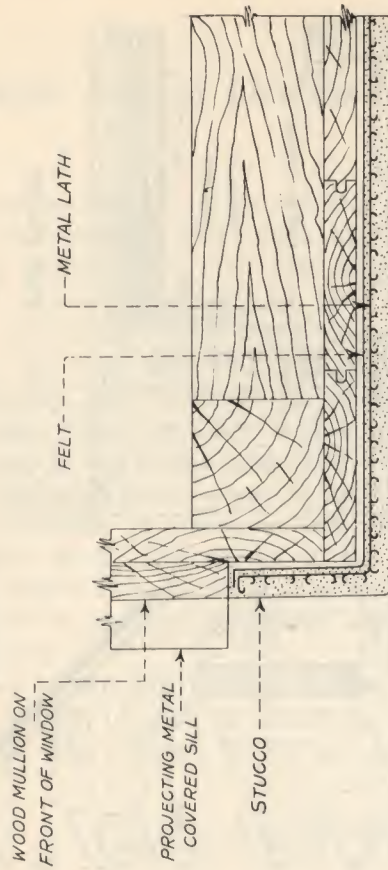


FIG. 2 SECTION ON LINE A-B IN FIG. 1
— SCALE 2"=1'-0" —

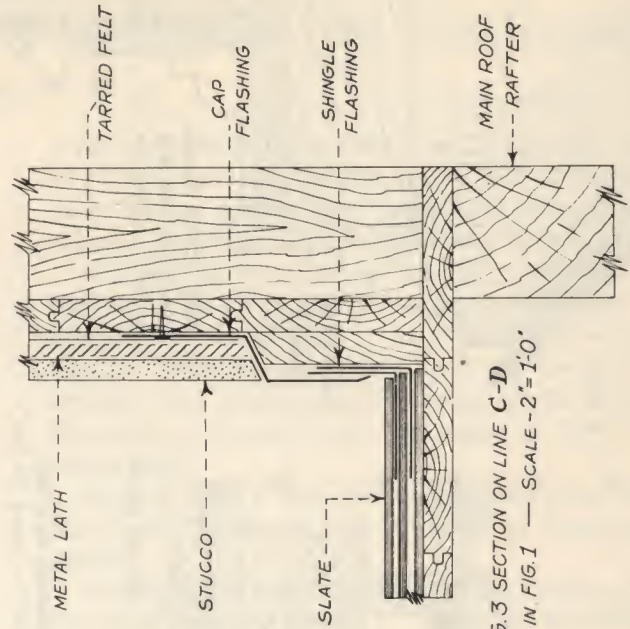


FIG. 3 SECTION ON LINE C-D
IN FIG. 1 — SCALE 2"=1'-0"

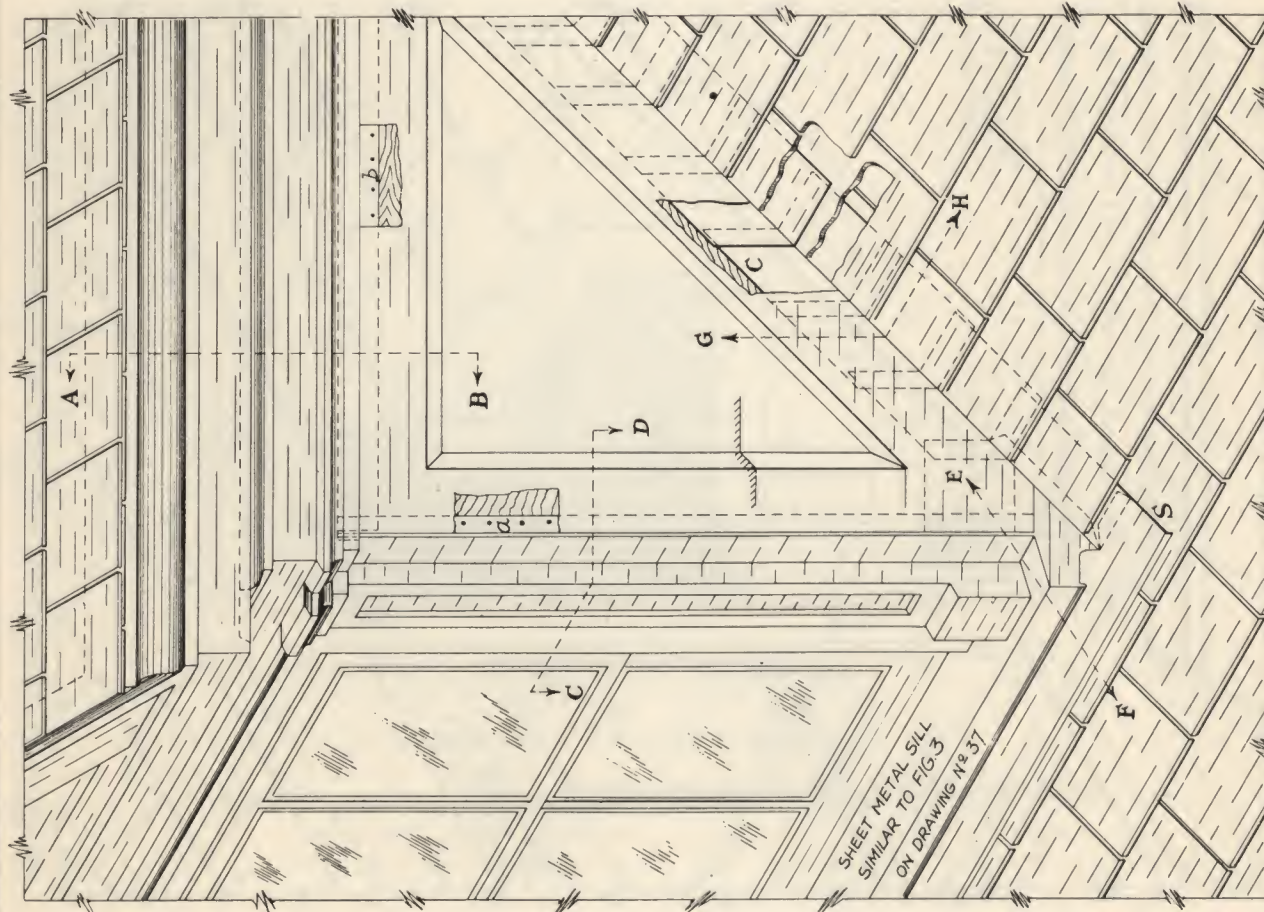


FIG. 1 FLASHING DORMER WINDOW WHEN ENTIRE DORMER IS OF SHEET METAL

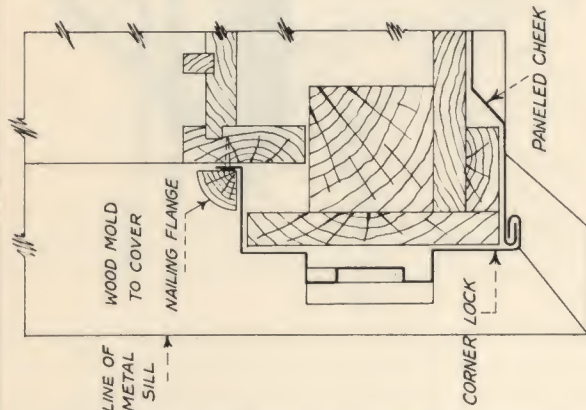


FIG. 3 SECTION THROUGH PILASTER ON LINE C-D IN FIG. 1 - SCALE 2"=1'-0"

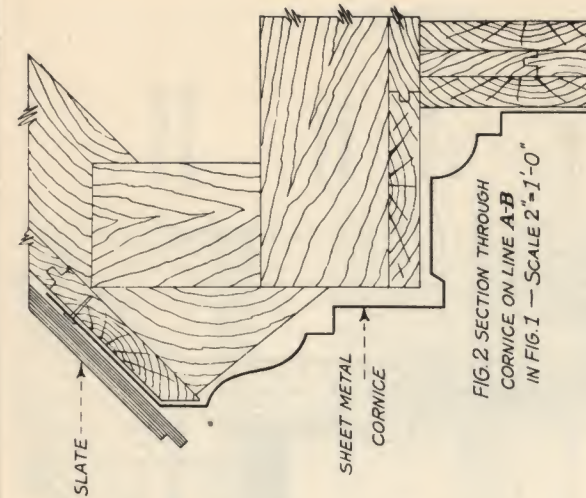


FIG. 2 SECTION THROUGH CORNICE ON LINE A-B IN FIG. 1 - SCALE 2"=1'-0"

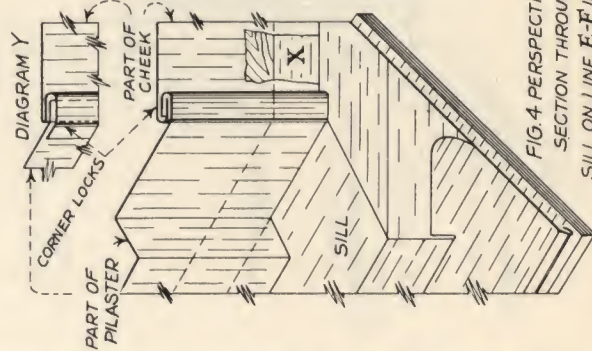


FIG. 4 PERSPECTIVE SECTION THROUGH SILL ON LINE E-F IN FIG. 1

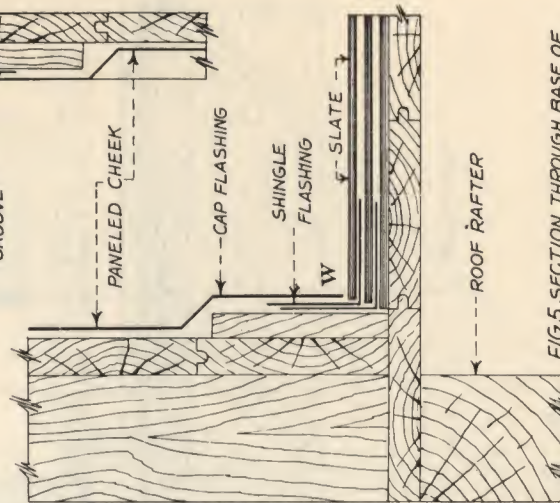


FIG. 5 SECTION THROUGH BASE OF CHEEK ON LINE G-H IN FIG. 1 - SCALE 2"=1'-0"

Sheet Metal Dormer Window on Slate or Flat Tile Roofs

Drawing No. 39

In Drawing No. 39 are shown the methods of erecting the siding and various flashings when the entire dormer is covered with sheet metal.

Fig. 1 shows a perspective view of such a dormer. The entire sheet metal dormer is completed in the shop with sill, pilasters and pediment attached, but without the cornice returns and cheeks. After the slate is laid to course *S*, the dormer is set plumb and true with the sill flashing being set over course *S*, and the shingle flashing soldered in place as indicated by the dotted lines at *E*. The flange of the pilaster is nailed as shown at *a* and when the cornice returns are soldered in position, the flange of the cornice is nailed as at *b*.

The roof is laid with shingle flashings inserted between courses of slate as shown in the broken view at *C*. The paneled cheeks are set last, the

vertical corners being locked with a double seam or Pittsburgh lock and the upper part of the cheek inserted in a groove provided at the bottom of the cornice, as shown in the following detail.

A detail on the line *A-B* in Fig. 1 through the cornice is given in Fig. 2. A section through the pilaster on the line *C-D* in Fig. 1 is shown in Fig. 3. Note the construction of the corner lock between the pilaster and paneled cheek. Before this lock is turned over, the seam is filled with white lead.

Note in Fig. 4 that the lock overlaps the flashing *X*. A Pittsburgh lock is shown in Diagram *Y* above.

A section through the base of the cheek on the line *G-H* is shown in Fig. 5. Note that the base *W* acts as a cap flashing over the shingle flashings and slate.

Gable Wall Flashing on Slate or Tile Roofs

Drawing No. 40

Drawing No. 40 shows how flashings are laid against gable walls with various kinds of roof covering. In Fig. 1 is shown the method of applying shingle and cap flashings when the roofing is of slate, flat tile or shingles. The drawing is self-explanatory.

Care is taken to obtain a tight joint where the gutter flashing joins at the corner marked *X*. All shingle flashings are hooked over the upper end of slate, as shown on the last course marked *Y*.

If the cap flashing is not built in the wall as the masonry progresses, the joint is dug out not less than $1\frac{1}{2}$ in. and the cap flashing inserted with an

upturned edge, which is secured to the brick joint with lead plugs about 1 in. wide and the full depth of $1\frac{1}{2}$ in. The cap flashing at the lower corner is double locked and soldered as shown more clearly in the section through *A-B* at the bottom of Fig. 1.

Fig. 2 shows the combination base flashing and valley used in connection with Spanish tile roofing. This base flashing *A* is covered with stepped cap flashings secured in a manner just described and shown at *B*.

A one-quarter full size detail of the base flashing and valley is shown in Fig. 3.

Wall Flashings on Slate or Tile Roofs

Drawing No. 41

The methods of applying cap and base flashings in connection with various roof coverings are presented in Drawing No. 41.

Fig. 1 shows the method when the wall is of rubble stone and the cap flashing covers the entire wall to avoid seepage. The wall is started with brick, to form a level base for the flashing, which covers the entire wall and makes a pan which acts as a complete cut-off for water penetrating the wall.

To prevent the base flashing from slipping down, cleats about 1 in. wide are nailed to the brick wall as shown at *A*, spaced about 12 in.

apart to suit the vertical joints in the brick work. After the base flashing is inserted, the lower end of the cleat is turned over the flashing shown at *B*.

Fig. 2 shows a Spanish tile roof abutting a wall. In this case, the cap flashing extends in the wall the width of a brick with an upturned flange of 1 in. as shown. After the tiles are laid on felt and the tile top fixture *X* is in position, the cleat is nailed to the brick joint, the base flashing slipped under the cap flashing and the lower end of the cleat *C* turned over as at *D*.

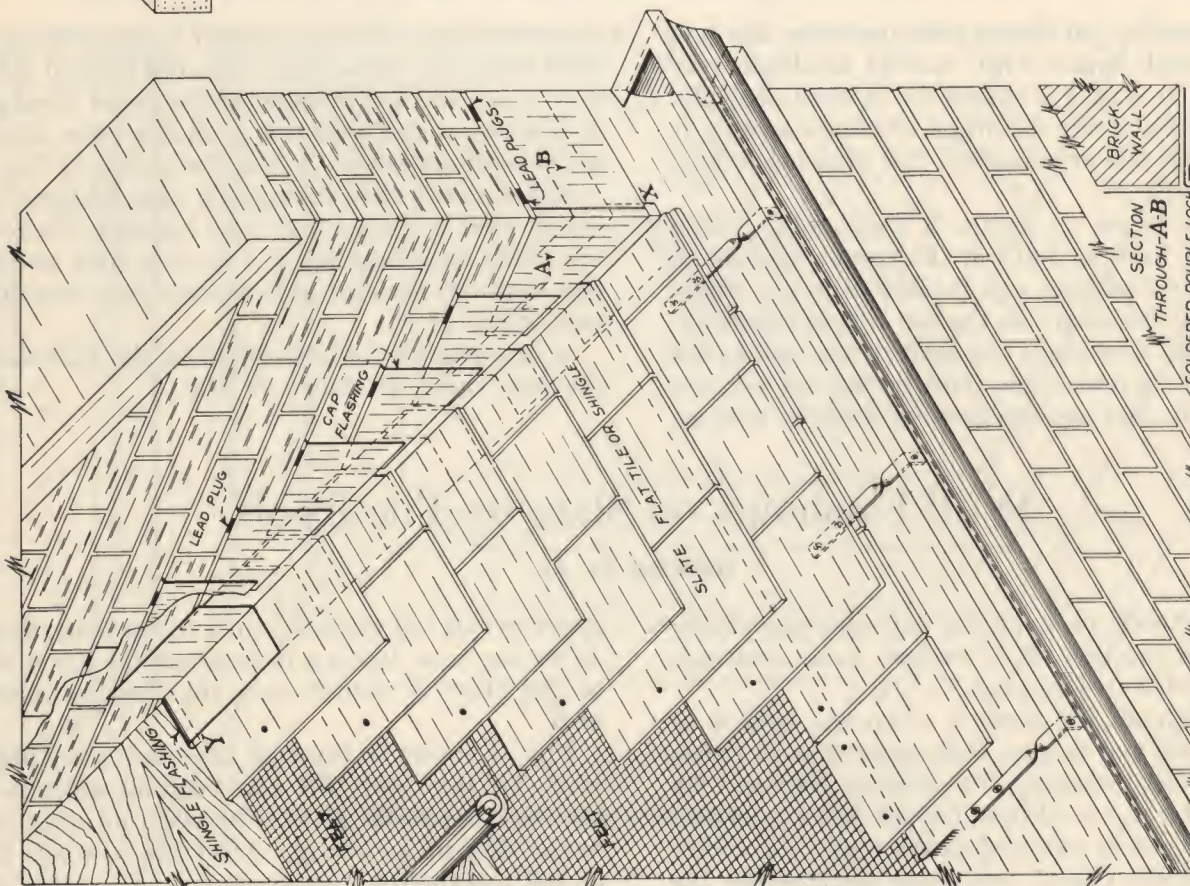


FIG. 1 METHOD OF APPLYING SHINGLE AND CAP FLASHINGS AGAINST GABLE WALL WHEN ROOF IS COVERED WITH EITHER SLATE, FLAT TILE OR SHINGLE

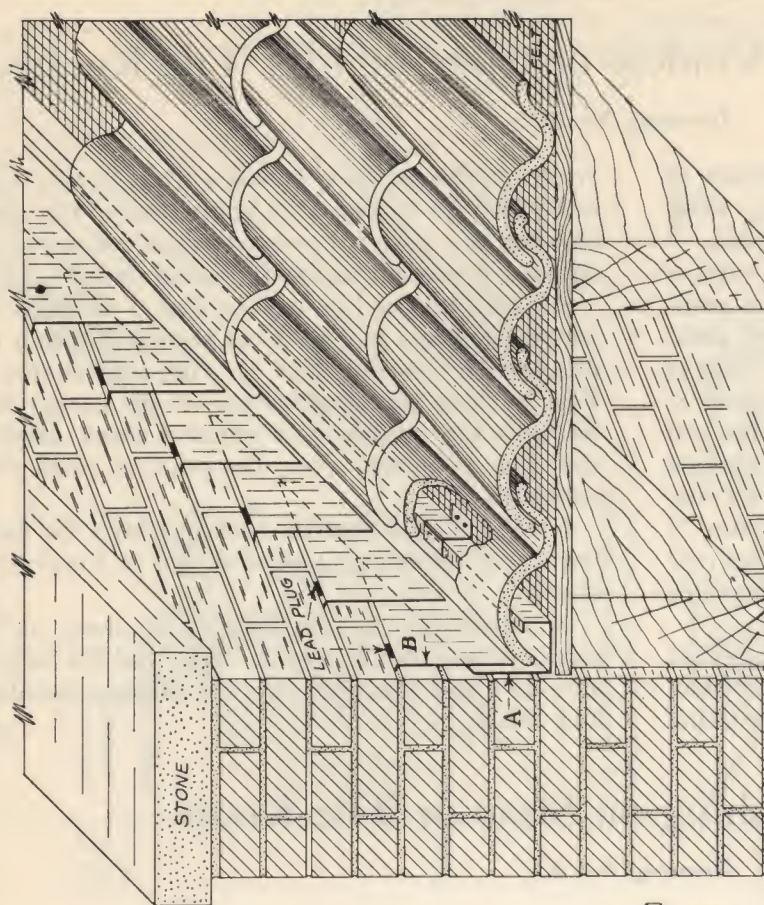


FIG. 2 METHOD OF APPLYING COMBINATION BASE FLASHING AND VALLEY, USED IN CONNECTION WITH SPANISH TILE ROOFING - SCALE 1"=1'-0"

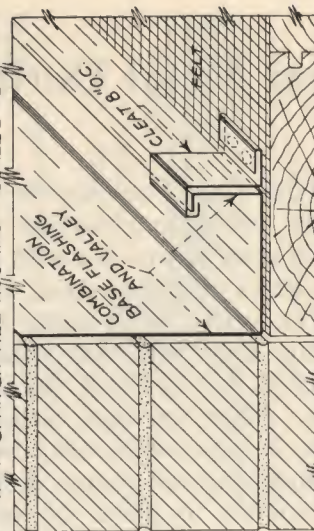


FIG. 3 DETAIL SHOWING METHOD OF SECURING BASE FLASHING VALLEY - SCALE 3"=1'-0"

NOTE
FOR FLASHINGS AT
WALL ABUTMENT SEE
FIG. 1 AND 2 ON
DRAWING No 41

DRAWING
NUMBER 40

GABLE WALL FLASHING ON SLATE OR
TILE ROOFS

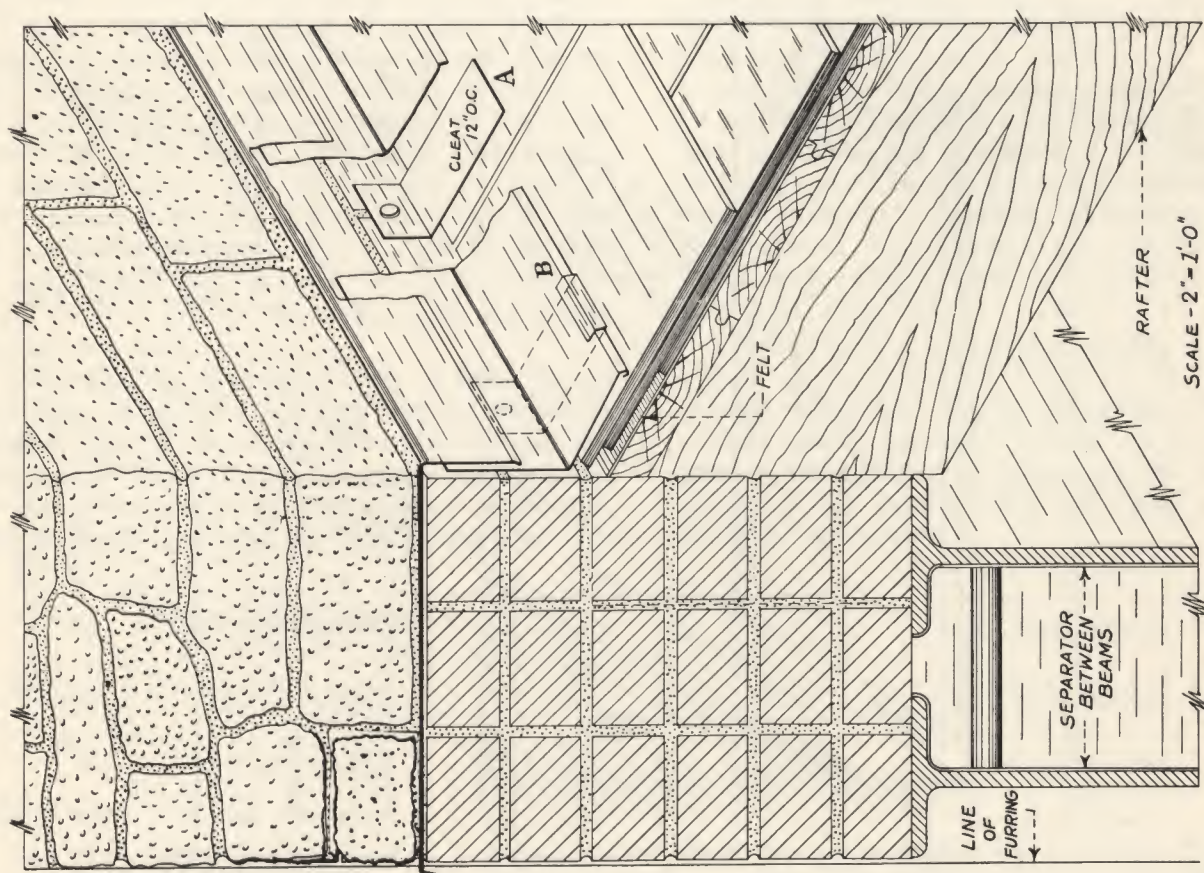


FIG.1 METHOD OF APPLYING CAP AND BASE FLASHINGS AT WALL ABUTMENT
IN CONNECTION WITH RUBBLE WALL FOR SLATE, FLAT TILE OR SHINGLE ROOF

SCALE - 2" = 1'-0"

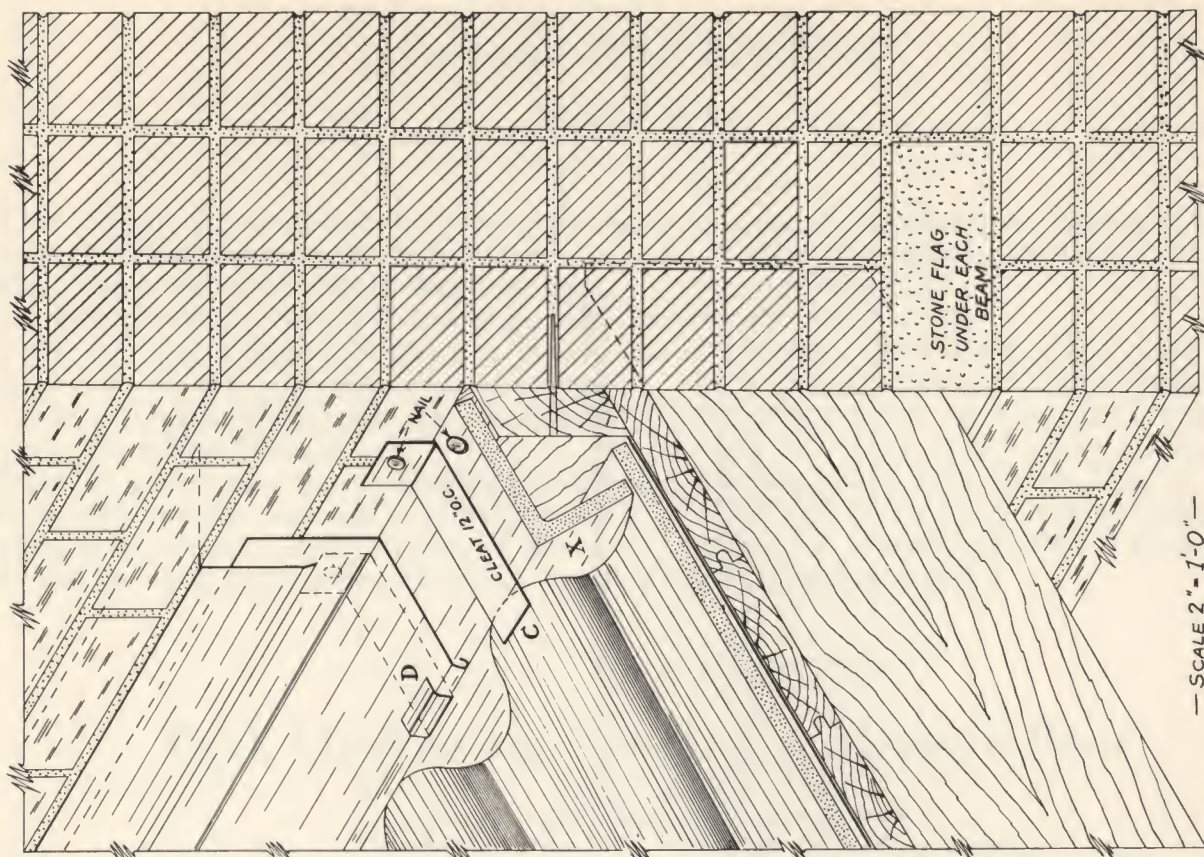


FIG.2 METHOD OF APPLYING CAP AND BASE FLASHINGS AT WALL ABUTMENT
IN CONNECTION WITH BRICK WALL AND SPANISH TILE ROOF

SCALE 2" = 1'-0"

DRAWING
NUMBER

41

WALL FLASHINGS ON SLATE OR
TILE ROOFS

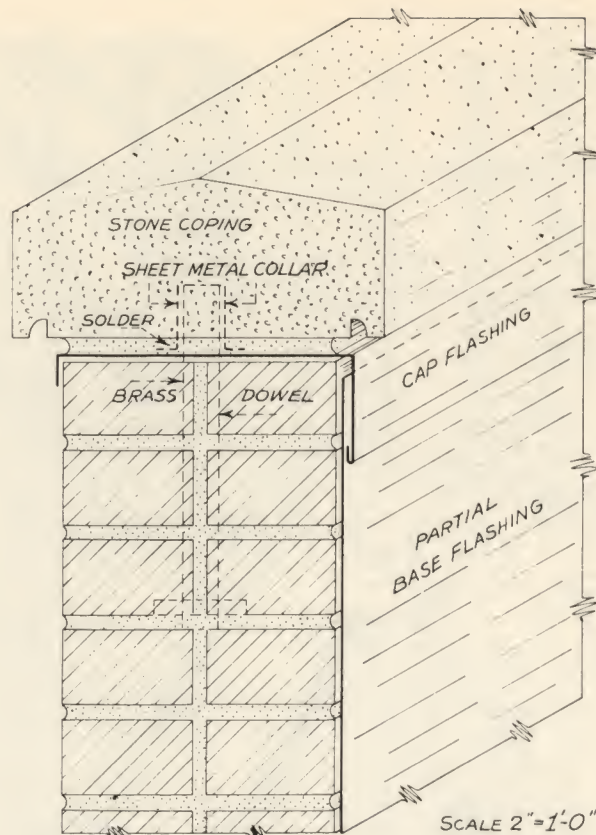


FIG. 1 METHOD OF FLASHING A BRICK PARAPET WALL NOT OVER 16 IN. ABOVE ROOF LINE—CAP FLASHING TO COVER FULL WIDTH OF WALL UNDER COPING

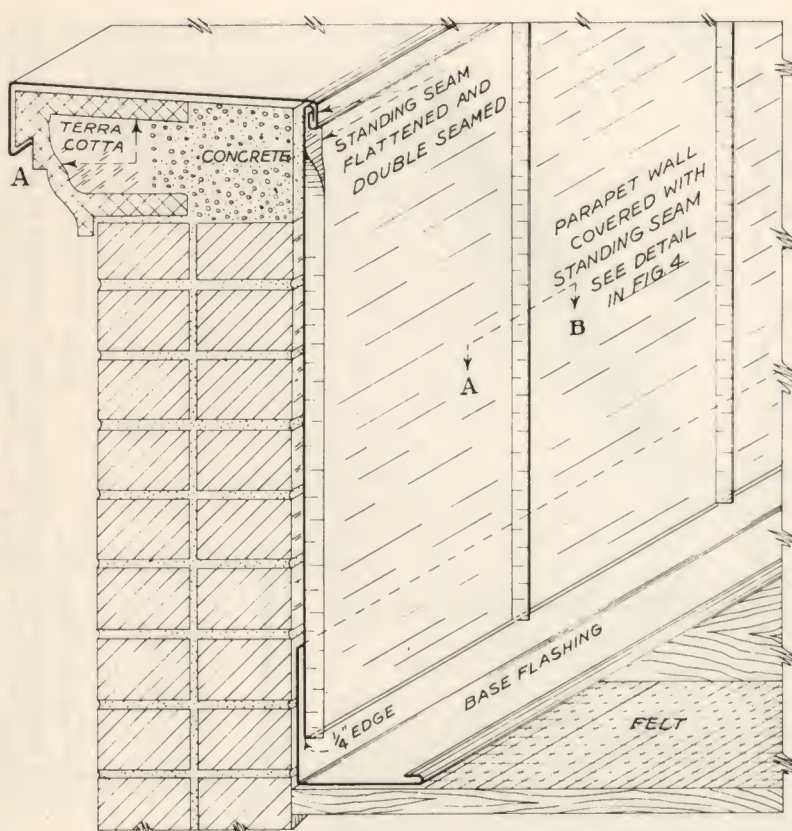


FIG. 3 FLASHING BRICK PARAPET WALL AND TERRA COTTA COPING WHEN WALL IS OVER 16" ABOVE ROOF LINE SCALE - 1 1/2"=1'-0"

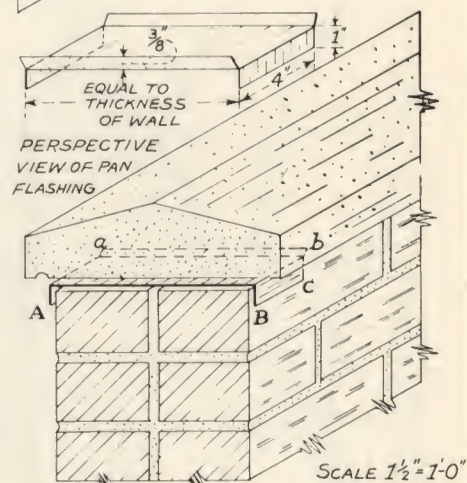
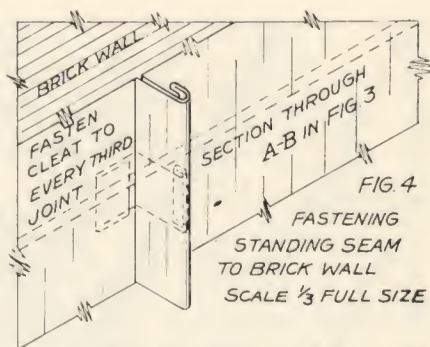


FIG. 5 FLASHING COPING JOINT TO PREVENT SEEPAGE OF WATER

Parapet Wall Flashing

Drawing No. 42

Three methods of protecting parapet walls against seepage of water are given in Drawing No. 42.

Fig. 1 shows the entire wall covered with sheet metal under the coping. Note that dowels are built into the wall and around each dowel a flanged collar is soldered. When the wall is not more than 16 inches above the roof line, flat base flashing is slipped under the cap flashing.

When the wall is more than 16 inches above the roof line and the entire surface is to be covered, the standing seam method is used as shown in Fig. 3. Note that the metal hooks under the drip at A. In

this case the standing seam covering also acts as a cap flashing overlapping the base flashing not less than $3\frac{1}{2}$ inches.

Fig. 4 is a section through A-B in Fig. 3. Fig. 5 shows the method of preventing seepage through the coping joints by inserting a pan flashing under each joint. A-B-C shows the shape of the flashing, turned down about 1 in. on each side of the wall with a $\frac{3}{8}$ -in. upturned edge at a-b to receive the seepage and allow it to drain to the face of wall at A and B.

Deck Molding and Flashing at Mansard Roof

Drawing No. 45

Three types of connections between mansard and deck roofs are presented in Drawing No. 45.

Fig. 1 shows the method of making a watertight connection between a mansard roof covered with slate, tile or shingles and a deck roof covered with composition roofing. The finish at the intersection is made with a sheet metal deck cornice around the four sides of the roof in which a box gutter is formed, the water being drained to inside cast iron drain pipes. Care is required in setting the deck cornice to obtain a storm-proof joint A where the metal mold fits snugly against the slate.

After the last course of slate is laid, clamps indicated at B, are screwed to the sheathing spaced about 30 in. apart. The lower leg of the clamp is not more than $\frac{1}{8}$ in. above the slate line, so that when the lower flange of the metal cornice is hooked between the clamp and slate, the

cornice is in a level position to secure the braces with anchor nails as shown at C. The gutter is locked to the projecting edge at E and turned up flush with the roof line as shown at F.

As the deck roof in this case is of gravel, slag or flat tile, a combination cap flashing and gravel stop is nailed over the felt and the gravel, slag or flat tile roof is laid in the usual manner.

Fig. 2 shows a sectional view of a mansard roof covered with Spanish tile connecting to a metal covered deck roof and the ridge finished with a tile ridge roll.

Another type of finish at the ridge is given in Fig. 3. A wood ledge is nailed at the ridge line against which the slating stops and the metal roofing flashes against this ledge as shown. The base of the cresting is formed in one piece and acts as a cap flashing over the metal and slate roofs, all as shown.

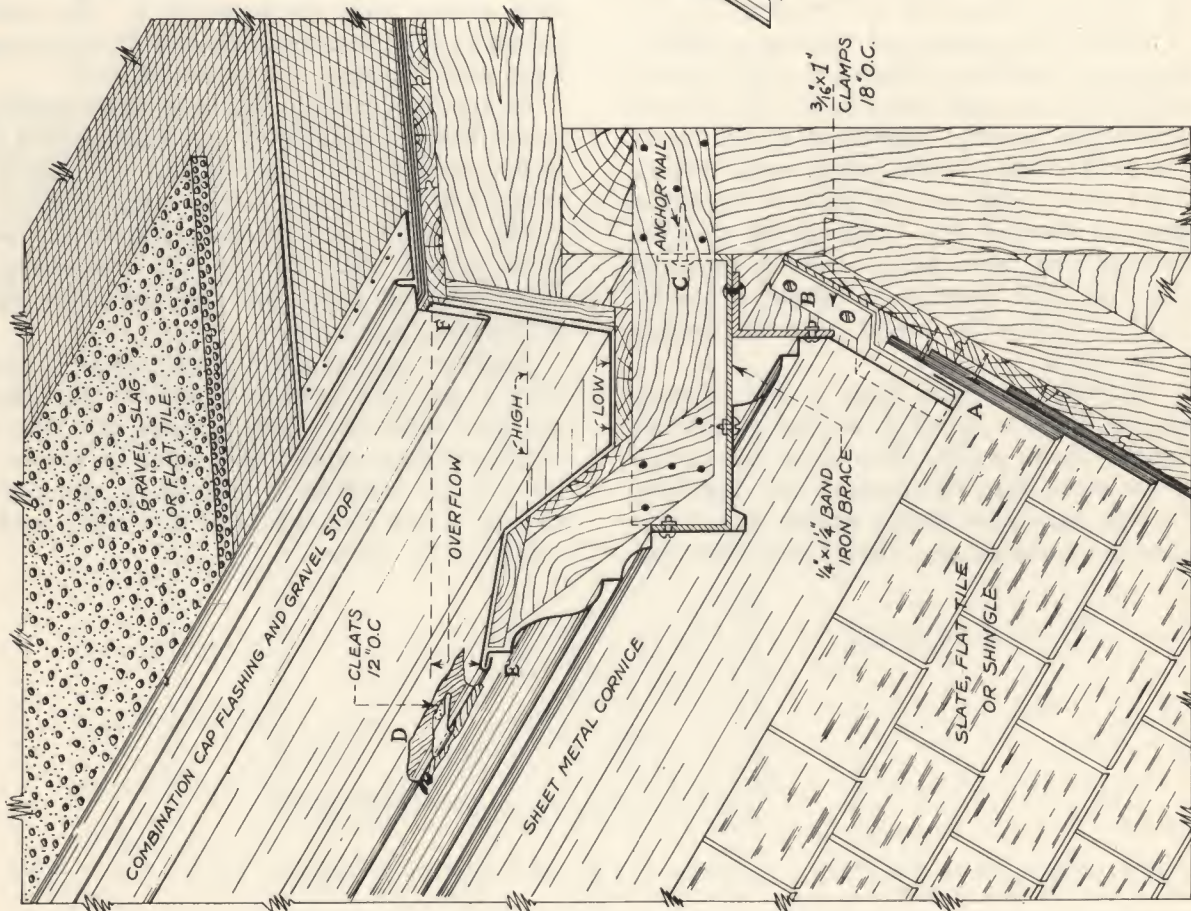


FIG. 1 METHOD OF MAKING WATER-TIGHT CONNECTION, BETWEEN DECK CORNICE AND MANSARD ROOF, COVERED WITH SLATE 1'-1'-0"

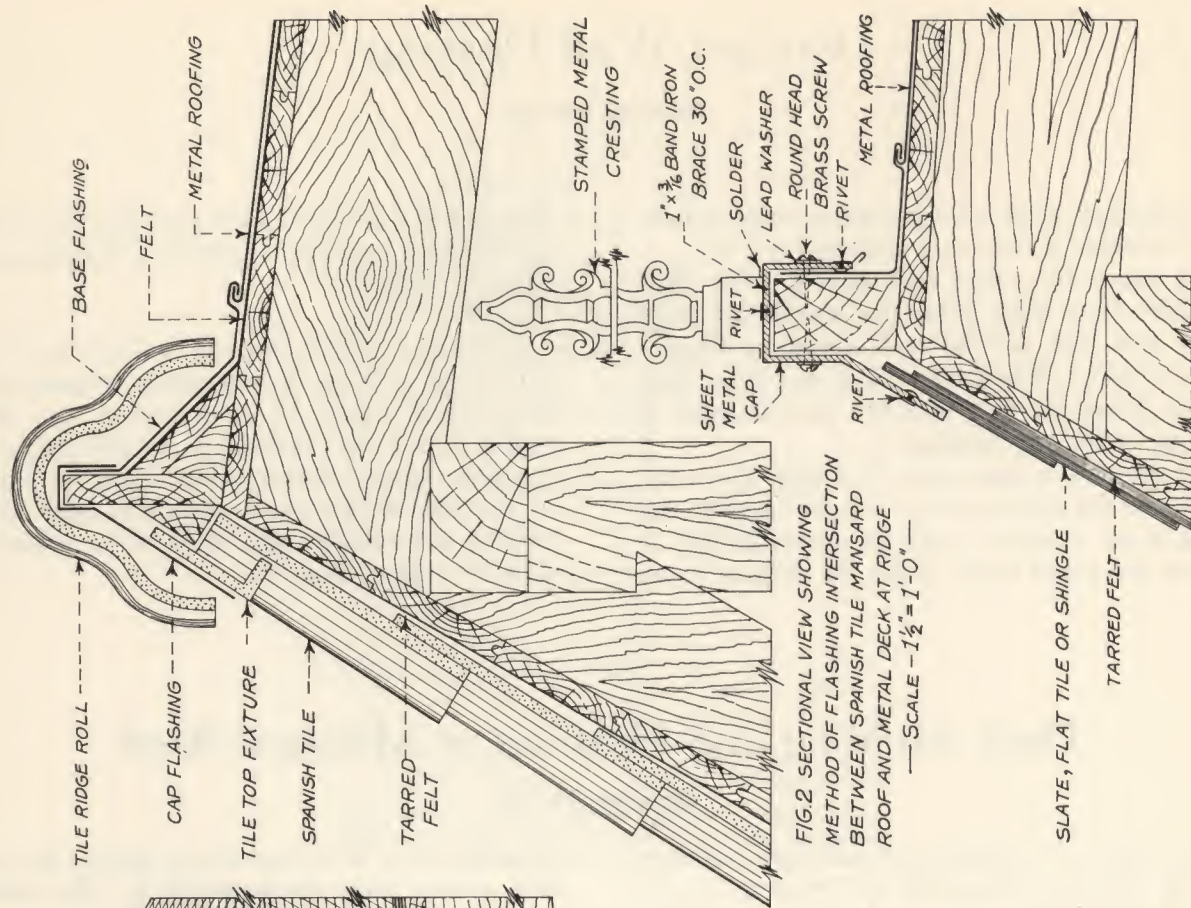


FIG. 3 FLASHING INTERSECTION BETWEEN SLATE MANSARD AND METAL DECK FINISHED WITH STAMPED CRESTING. SCALE - 1 1/2" = 1'-0"

Saw Tooth Roof—Ridge Mold and Flashing

Drawings No. 48-48A

The method of making water-tight connections at ridges of saw tooth roofs covered with slate, flat tile or shingles and with either slate, flat tile, shingle or corrugated sheet iron sidings, is shown in Drawing No. 48.

Fig. 1 shows the procedure when the window frames and sash are of wood, the siding covered with corrugated sheet iron and the roof covered with either slate, flat tile or shingles. The head of the window is flashed first, as shown by *A-B*. *A* extends up not less than 4 in. and *B* forms a drip. At the ridge of the roof blocking is nailed as indicated by *C* and *D*. The width of the blocking *C* is $\frac{1}{8}$ in. more than the thickness of three slate.

After the slate is laid, the sheet metal ridge cap is placed in position, being nailed below the groove *H*, which receives the corrugated sheets. At the top roof line the hem edge *E* is pressed firmly to the slate and secured with nails every 18 in. This holds down the flanges close to the slate line at *E*. When the ridge capping is in place, the corrugated siding is slipped into the groove *H* and nailed in the usual manner.

If a more elaborate finish is desired at the ridge, the capping is molded as indicated in Fig. 2. When both siding and roof are to be covered with slate, flat tile or shingles and the window frames and sash are of hollow metal, the method of flashing is indicated as in Fig. 3. Here the flashing *X* and drip *Y* are formed directly to the hollow metal frame. The blockings *A* and *B* on the siding and *C* and *D* on the roof are nailed in position.

The siding and roofing slate are now laid in the usual manner, finished against the block. Over

the slate the sheet metal ridge mold is secured with nails as shown by *a* and *b*. When nailing the hem edged flanges *E* and *F*, they are pressed against the slate line.

Drawing No. 48A shows how the curb and sill of a monitor saw tooth front is flashed to composition roofing regardless of whether the sash and frame of monitor are of hollow metal or wood.

Fig. 4 presents the construction details when the frame and sash are of wood. The base flashing used in connection with the slag roof is set in the usual manner as indicated. The wood sill is metal covered, nailed at *A* on the outside and at *B* on the inside. After the sill is set, the cap flashing *X* is turned up and nailed behind the sill at *C*. On the inside of the lower part of the wood sash, a condensation gutter is attached as shown, with the metal tubes passing through the sash.

Fig. 5 shows one-half full size section of the condensation gutter and tube which clearly indicates the construction. In Fig. 6 is shown the construction when the sash, frame and sill are made of metal. Note the combination sill and cap flashing. This sill may be made of heavy metal but if light metal is used, it is filled with concrete as indicated. If the base flashing is of copper and the sill of galvanized iron, then both metals receive two heavy coats of asphaltum before erecting, so as to avoid galvanic action. On the lower part of the hollow metal sash, a gutter may be formed as shown to take care of the condensation which is conveyed to the outside by means of the condensation tubes.

The construction shown here is for a stationary sash. Both Fig. 4 and 6 are drawn to a scale of 2 in. to the foot.

Eaves and Verge Finish for Metal Roofs

Drawing No. 51

Drawing No. 51 shows ten types of eaves and verge finish for metal roofs, regardless of the kind of sheet metal used.

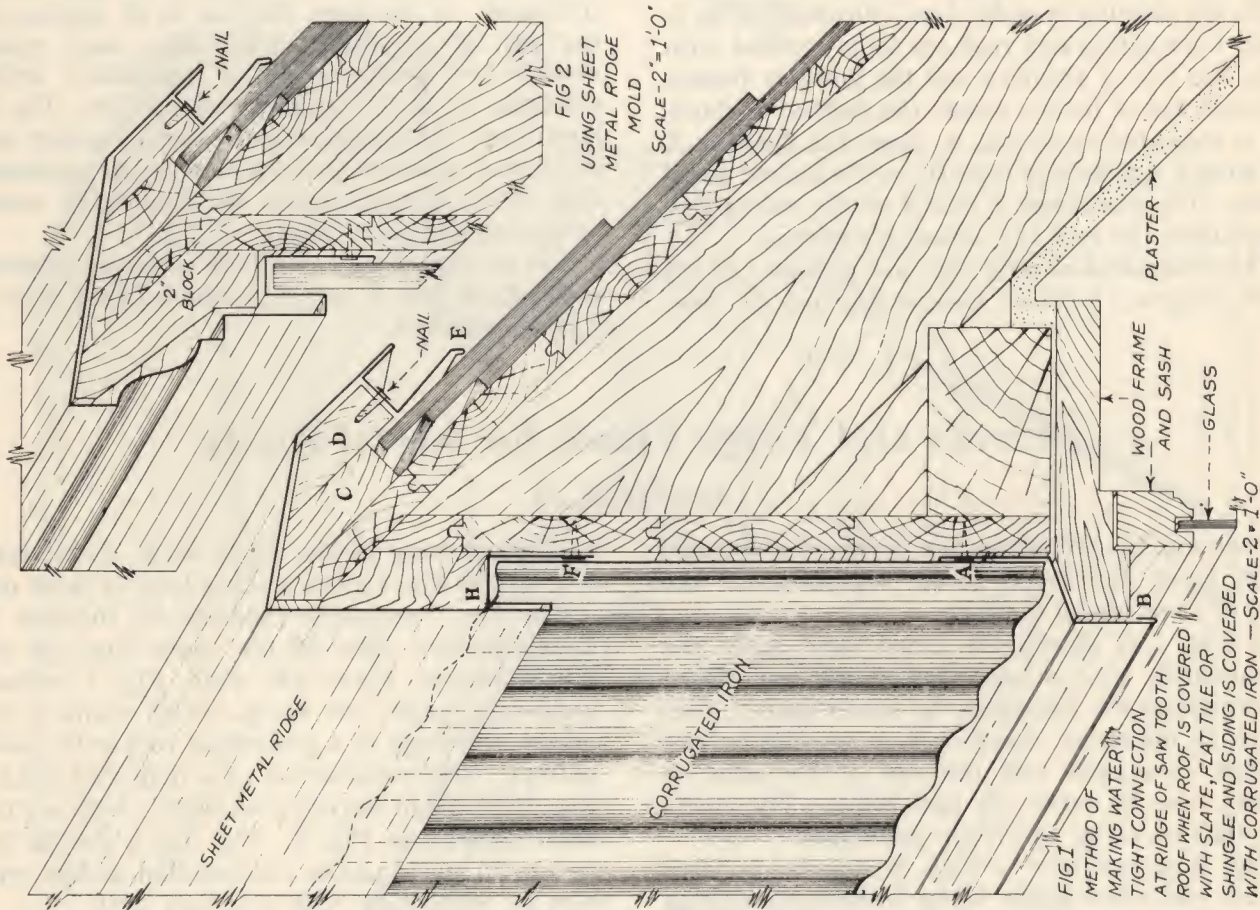
In Fig. 1 is shown the metal bent under the roof boards, with a lock edge at the top, which is secured to the sheathing by cleats spaced 8 in. apart, as indicated. Each cleat is secured by two barbed wire nails and the end of the cleat is turned over to cover the nail heads. The cleats are used on all of the types presented.

Fig. 2 shows how a drip is formed by two angles, the lower angle being secured by nailing 12 in. apart as indicated by *a* and *b*. Another drip made from one piece of metal is shown in Fig. 3. In Fig. 4 is shown the roof lock, hooked to the

projecting edge of the angle strip which forms a drip, and Fig. 5 gives another type of eaves drip.

The two operations required in forming the double-seamed edge at the eaves line are presented in Fig. 6 and 6A, while Fig. 7 indicates a molding under the eaves, which forms a drip on the underside of a projecting roof with molded rafters. The construction of a drip and mold on the underside of eaves in connection with a stucco wall is shown in Fig. 8. Fig. 9 is a similar drip and mold showing the construction at the verge, also in connection with a stucco wall.

Another type of verge construction in connection with a brick wall is shown in Fig. 10.



DRAWING
NUMBER 48

SAW TOOTH ROOF -- RIDGE MOLD
AND FLASHING

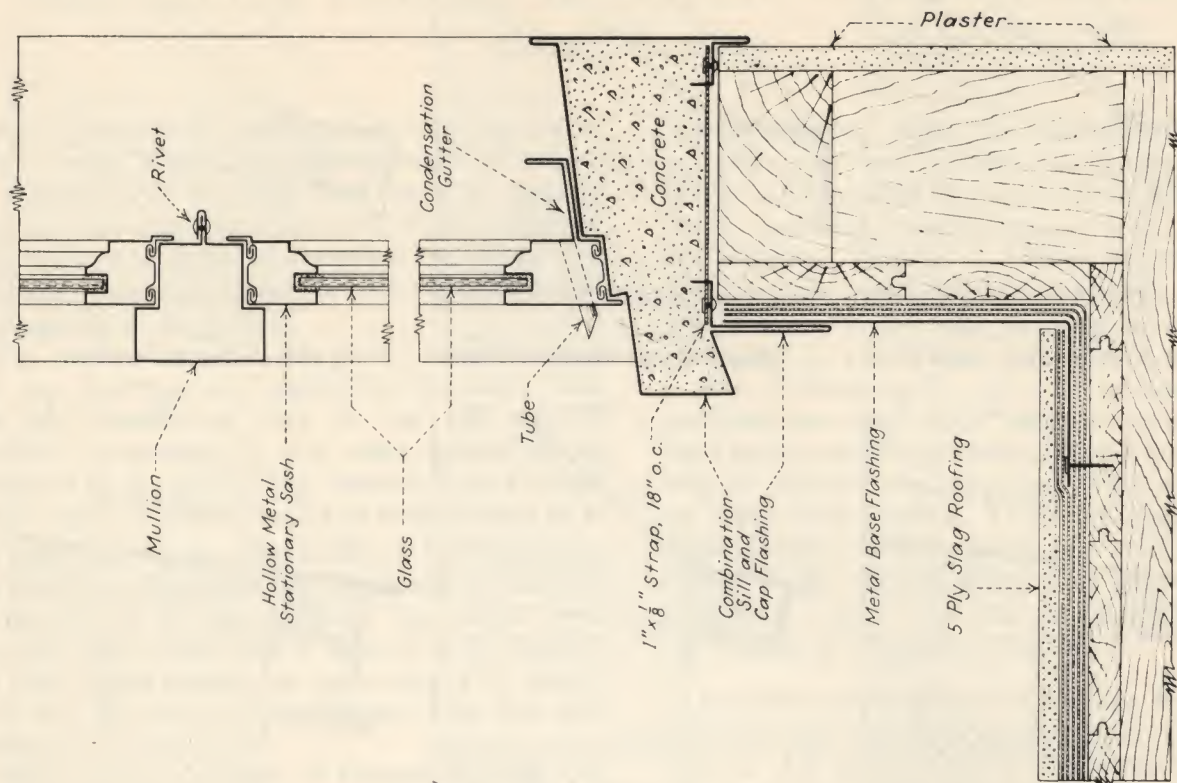


Fig. 6 METAL SILL OF SAWTOOTH SKYLIGHT AND COMPOSITION ROOFING
SCALE 2" = 1'-0"

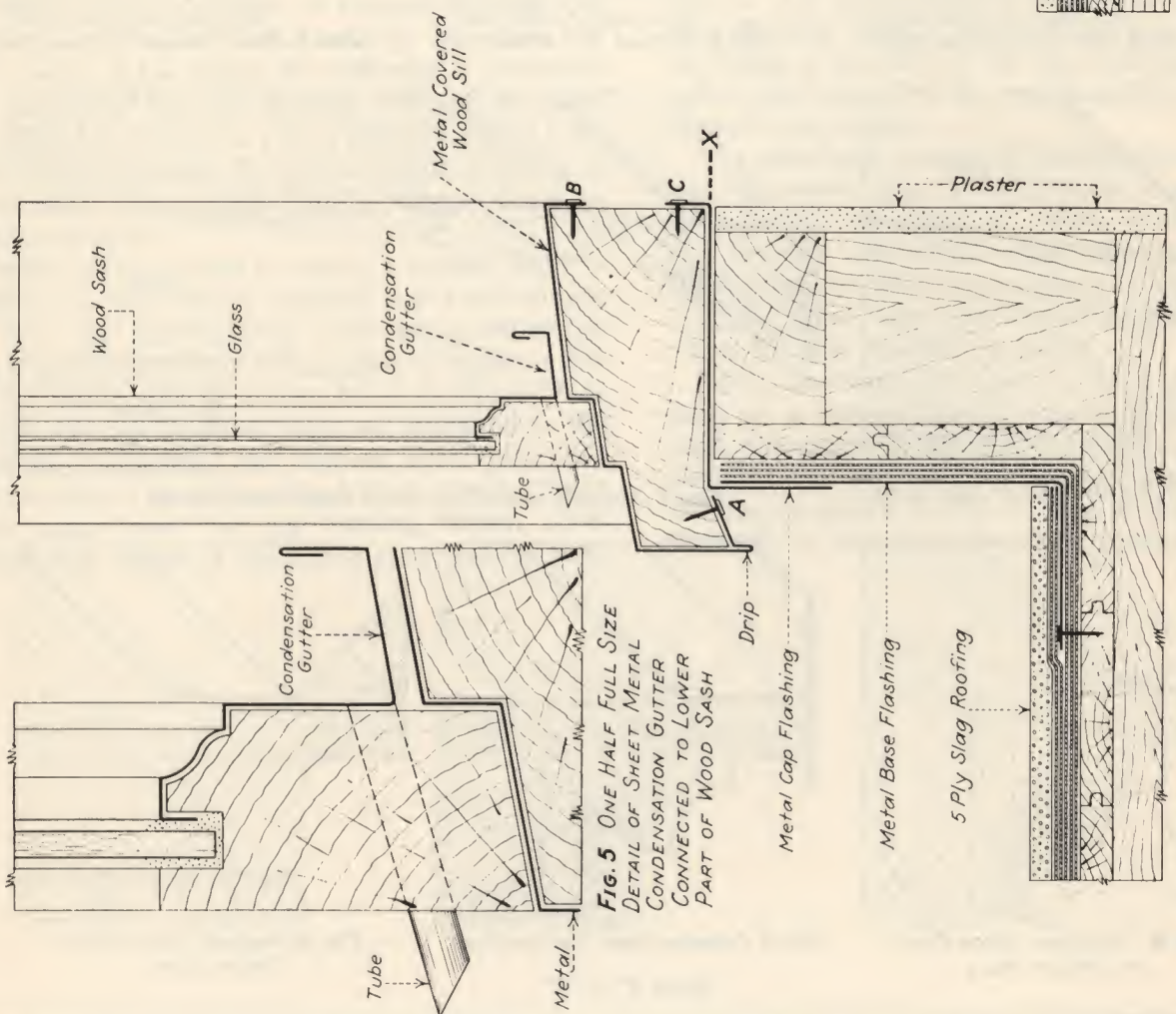


Fig. 4 METAL COVERED WOOD SILL OF SAWTOOTH SKYLIGHT AND COMPOSITION ROOFING
SCALE 2" = 1'-0"

Fig. 5 ONE HALF FULL SIZE
DETAIL OF SHEET METAL
CONDENSATION GUTTER
CONNECTED TO LOWER
PART OF WOOD SASH

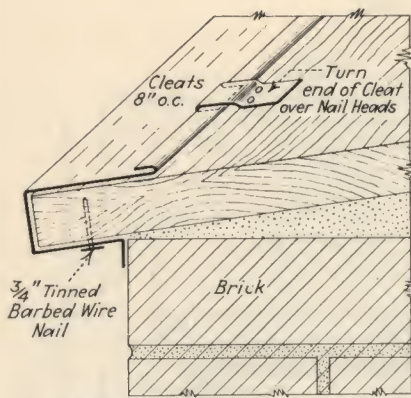


Fig. 1 METAL BENT UNDER EAVE

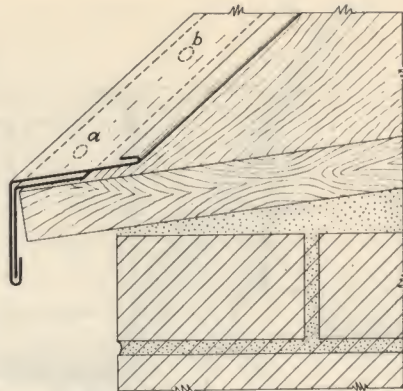


Fig. 2 DOUBLE ANGLES FORM DRIP

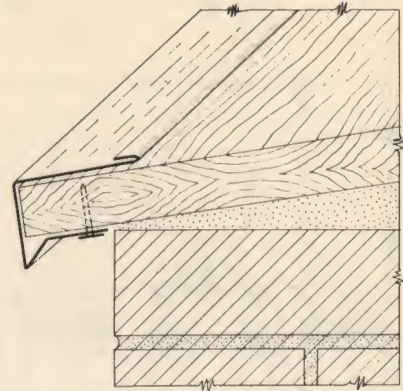


Fig. 3 DRIP IN ONE PIECE

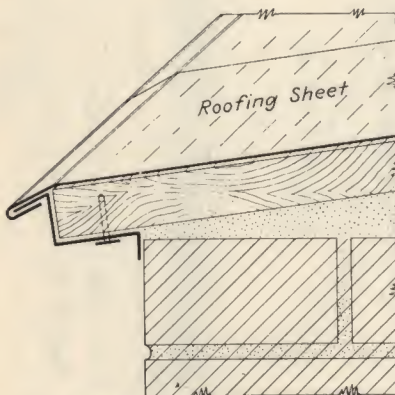


Fig. 4 ROOFING LOCK FORMS DRIP

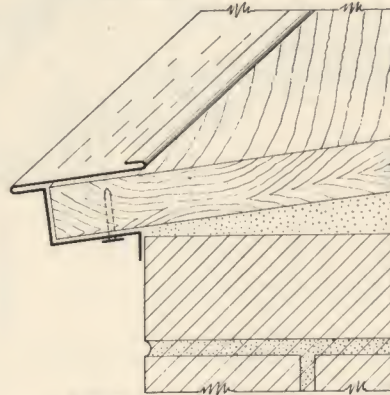


Fig. 5 ANOTHER TYPE OF DRIP

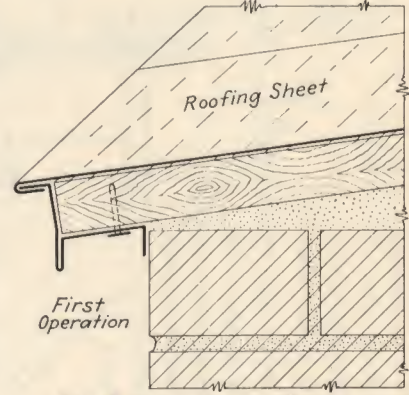


Fig. 6 DOUBL SEAM AT EAVE, LOCKED

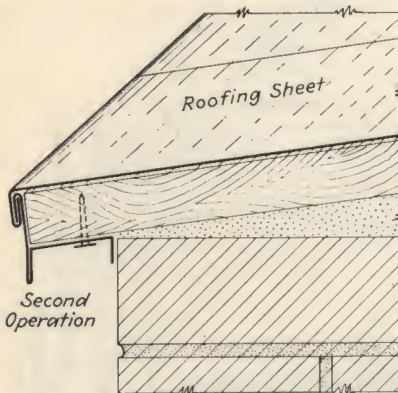


Fig. 6A DOUBLE SEAM AT EAVE, CLOSED

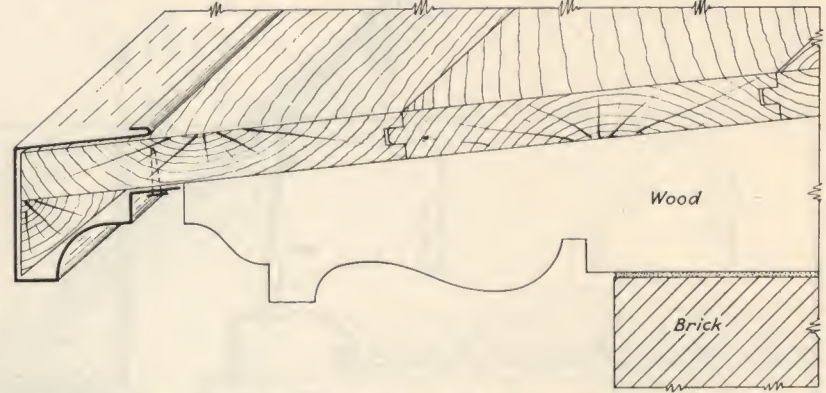


Fig. 7 MOLDING UNDER EAVE WITH PROJECTING RAFTER

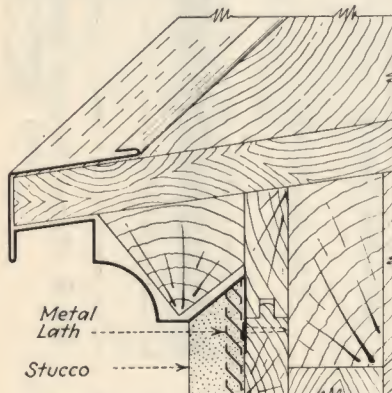


Fig. 8 MOLDING UNDER EAVE TO STUCCO WALL

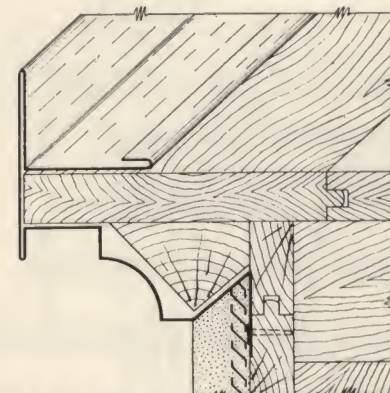


Fig. 9 SHOWING VERGE CONSTRUCTION

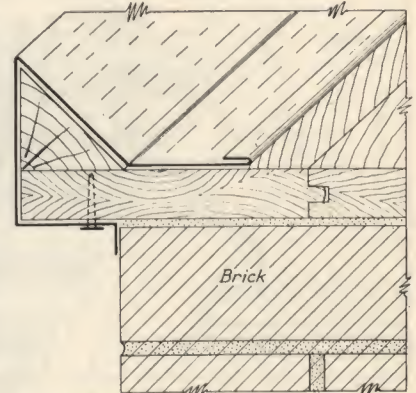


Fig. 10 ANOTHER TYPE OF VERGE CONSTRUCTION

SCALE 3"=1'-0"

Base and Cap Flashings to Walls of Various Construction

Drawings No. 52-52A

Four methods of joining base and cap flashings to brick, stone and concrete walls are shown in Drawing No. 52, and four ways of joining base and cap flashings to stucco, wood and terra cotta walls are given in Drawing No. 52A. The methods presented allow for the expansion and contraction of the metal.

Fig. 1, Drawing No. 52, shows how the base and cap flashings are applied to the brick wall. The cap flashing is built in the wall as the masonry progresses, a 1-in. edge turned up as indicated by *A*, making the distance *A* to *B* equal to the width of bricks used, and turned down at *B* not less than 3½ in. The height of the base flashing is not less than 8 in. and the flange on the roof is determined by the width of the sheets used. The lock edge on the roof is secured to the sheathing with cleats spaced not more than 8 in. apart, with the end of the cleat turned over the nail heads.

When there is danger of leakage through the coping and brick joints, causing dampness on the inside of the walls, the difficulty is overcome by extending the cap flashing through the wall as indicated in Fig. 2, where upright ridges 1 in. high are spaced to fit mortar joints forming a good bond. An outside edge is turned down as indicated by *C*.

With parapet walls of stone, a mortar joint is seldom in the correct position for the building in of a cap flashing, the joint being either too high or too low. For this reason a raggle is cut in the stone wall as shown by *A* in Fig. 3, into which the cap flashing (bent as indicated in the section) is inserted and secured with small lead plugs about 1 in. wide spaced 12 in. apart. These lead plugs hold the cap flashing firmly, after which the raggle is filled with lead wool or with

elastic cement. When the parapet walls are of concrete, provision is made for a raggle, by the use of a galvanized or copper sheet metal raggle mold, carefully set before the concrete is poured as indicated in Fig. 4. When the forms are removed, the result is a clean smooth metal raggle, to which the cap flashing is secured as described in connection with Fig. 3.

Fig. 5, Drawing No. 52A, shows how the connections are made with flashings between a flat roof and an adjoining vertical stucco wall, regardless of whether the wall base is of wood, brick or terra cotta blocks. After the height of the base flashing is determined, the wood strip *X* is nailed in its correct position as shown and the combined stucco stop and cap flashing secured by nailing at intervals *A* and *B*.

Over the upper flange of the cap flashing the building paper and the metal lath are applied, as shown. All stucco work is completed before the base flashing is set. The base flashing is slipped up inside of the lock of the cap flashing, as indicated, and secured to the roof sheathing by cleats spaced 8 in. apart.

If a solid back is desired behind the base flashing, the wood strip *X* is extended down to the roof line as at *a* and *b*. When vertical walls are covered with either slate, shingles or clap boards, the method of procedure is as shown in Fig. 6. Over this base flashing the shingles, slates or clap boards are nailed.

When the flat roof abuts a terra cotta wall, such as a cornice placed over a brick parapet wall, the raggle to receive the flashing flange is usually modeled in the terra cotta blocks before baking, as shown in Fig. 7. Fig. 8 shows how a skylight or other wood curb is flashed.

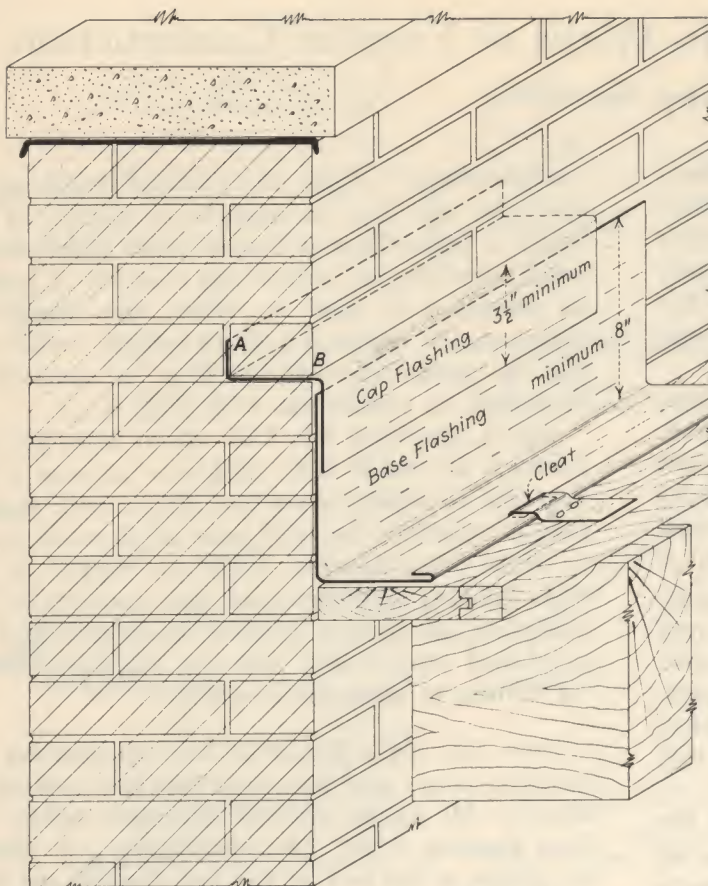


FIG. 1 BASE AND CAP FLASHINGS JOINING A BRICK WALL

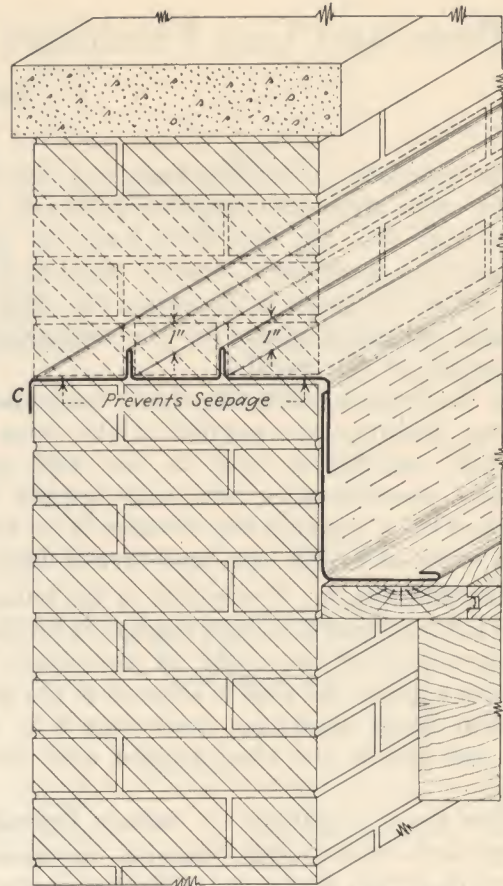


FIG. 2 CAP FLASHING COVERING ENTIRE WALL

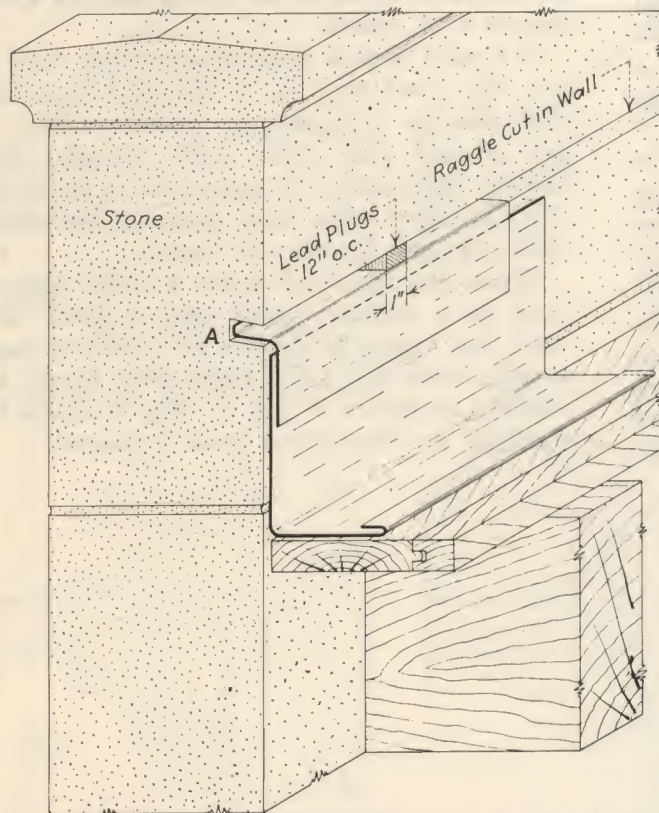


FIG. 3 BASE AND CAP FLASHINGS JOINING A STONE WALL

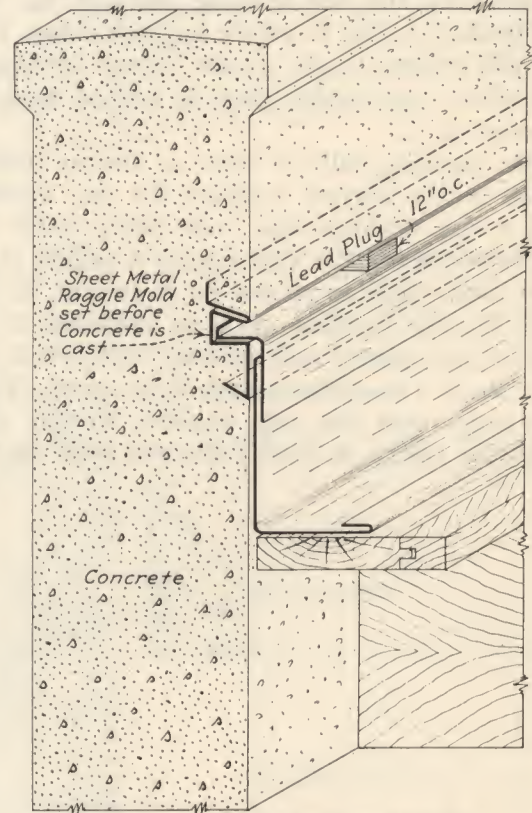


FIG. 4 BASE AND CAP FLASHINGS JOINING CONCRETE WALL

SCALE $1\frac{1}{2}" = 1'-0"$

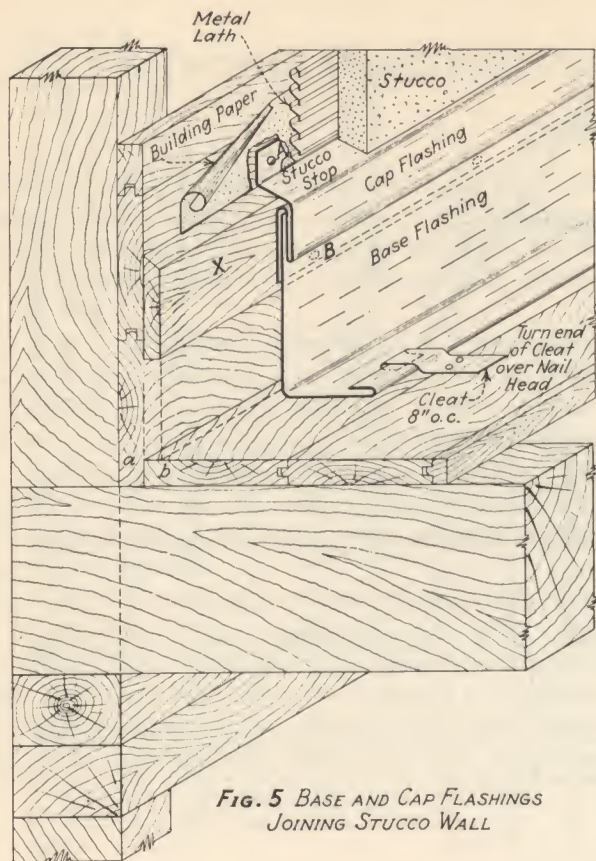


FIG. 5 BASE AND CAP FLASHINGS JOINING STUCCO WALL

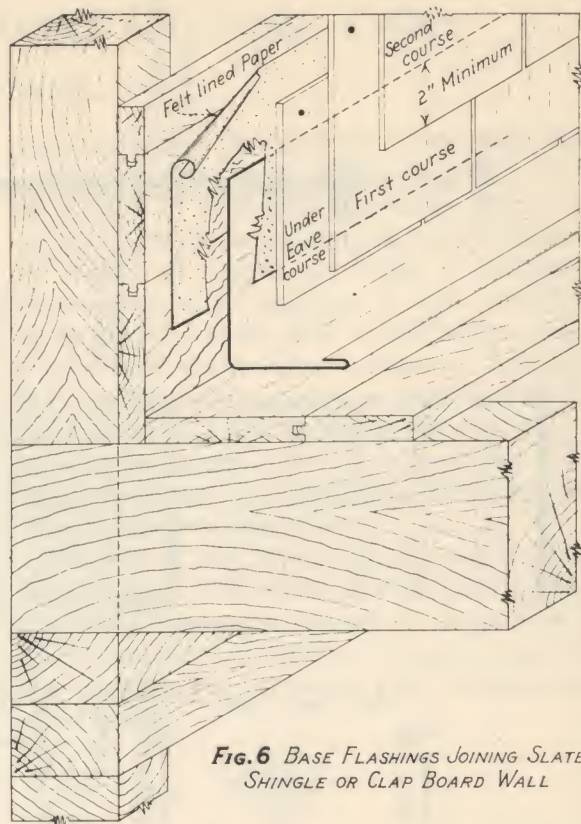


FIG. 6 BASE FLASHINGS JOINING SLATE, SHINGLE OR CLAP BOARD WALL

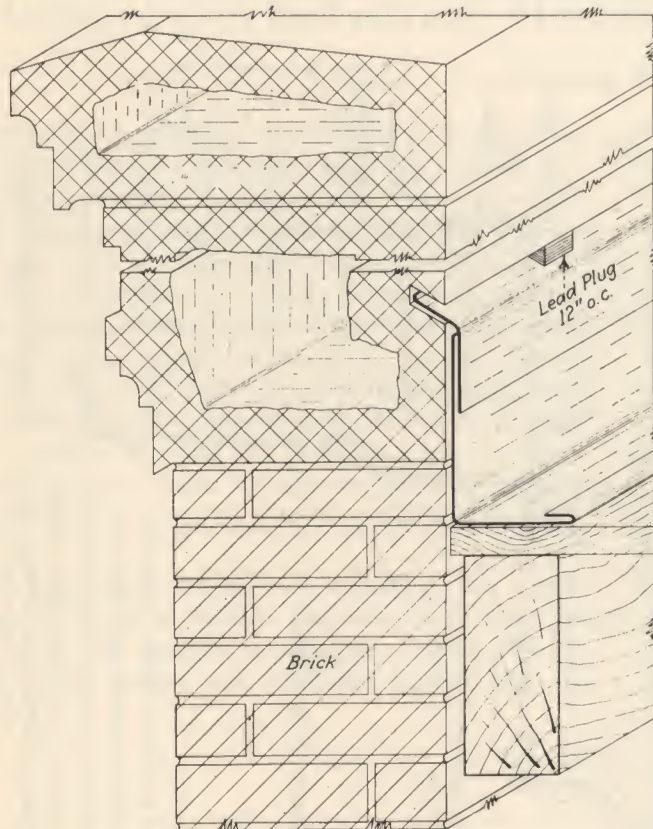


FIG. 7 BASE AND CAP FLASHINGS JOINING TERRA COTTA CORNICE ON PARAPET WALL

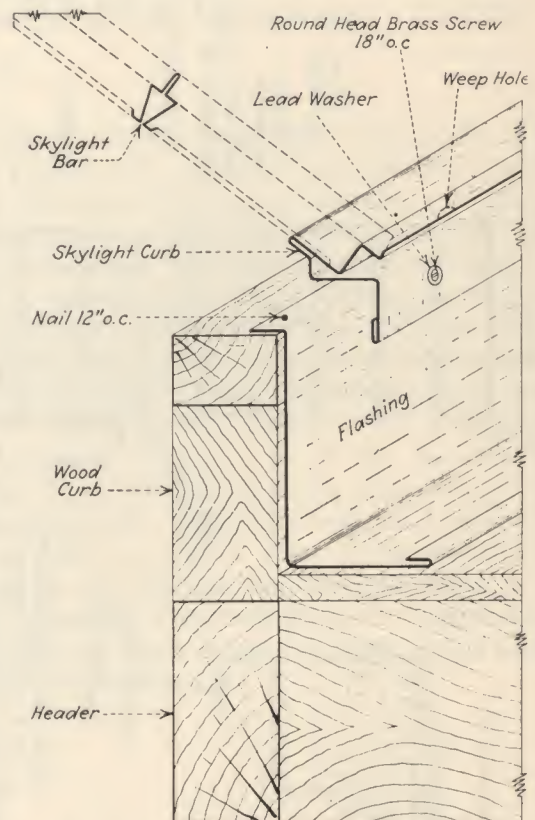
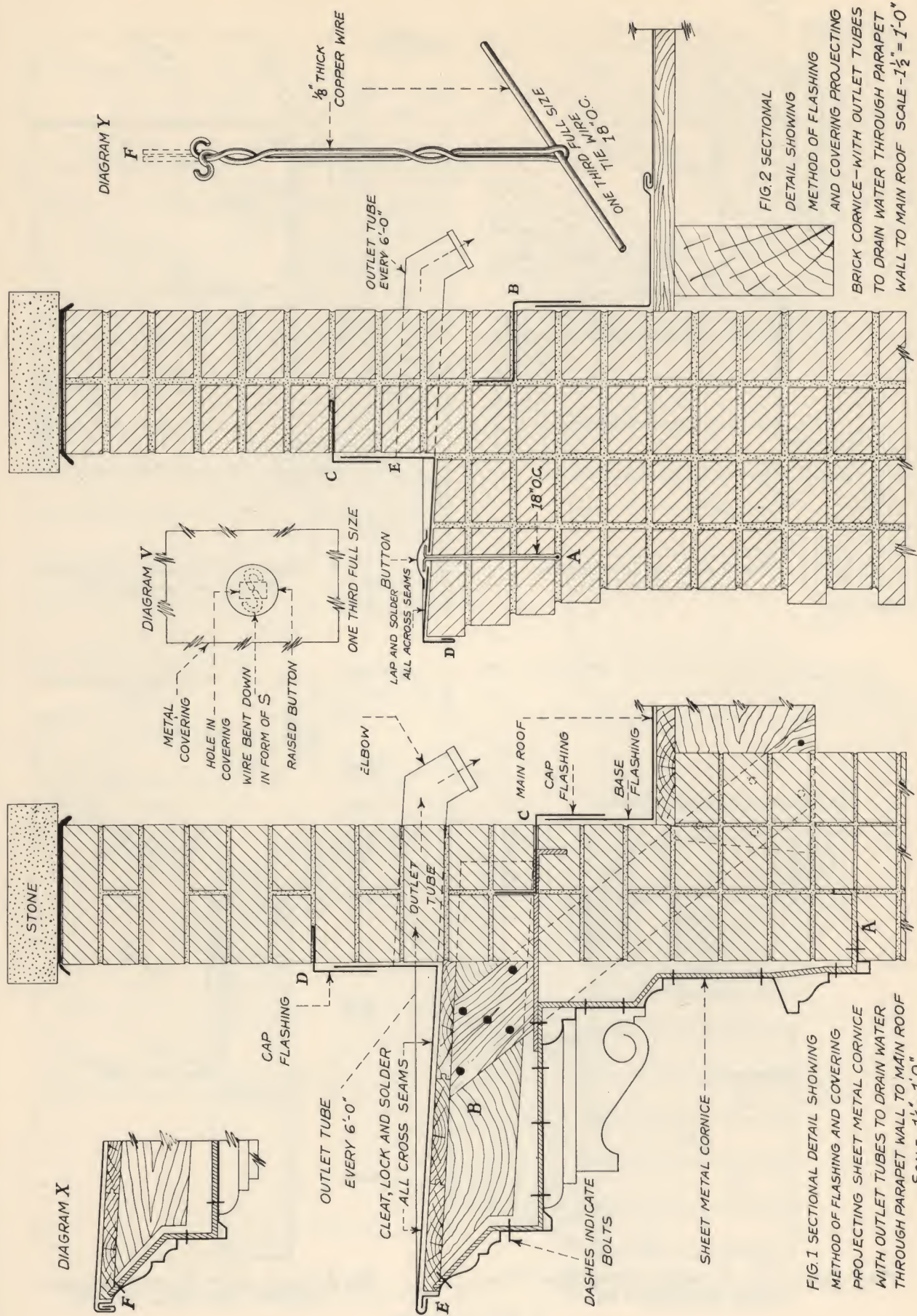


FIG. 8 BASE FLASHING JOINING WOOD CURB AND SECURING SHEET METAL SKYLIGHT

SCALE $1\frac{1}{2}'' = 1'-0''$

DRAWING
NUMBER 52A

BASE AND CAP FLASHINGS TO WALLS OF
VARIOUS CONSTRUCTION



DRAWING
NUMBER 70

CORNICE COVERING AND OUTLET
DRAINAGE TUBES

Cornice Covering and Outlet Drainage Tubes

Drawing No. 70

The method of flashing and covering the tops of sheet metal and brick cornices and utilizing outlet tubes to drain the water through the parapet walls to the main roof, is the subject of Drawing No. 70.

In Fig. 1 is shown a section of a sheet metal cornice. After the wall has been erected as high as *A*, the cornice is set and the wooden gutter bracket *B* nailed to each beam as indicated. When the masonry is as high as *C*, the cap flashing for the main roof is set, the wall continued as high as *D*, the cap flashing for the cornice placed and the masonry completed.

The roof is covered as shown, being locked to the front edge of the metal cornice as at *E*. The lock *E* may be turned down as shown at *F*, Diagram *X*. Openings about 6 ft. apart are left in the wall for outlet tubes, constructed as indicated. These tubes are passed through the wall from the

inside, flanged and soldered to the base flashing.

Fig. 2 shows the procedure when the cornice is of brick. In this case the metal covering may be laid directly on the pitched brick roof, secured by means of copper tie wires as follows: Tie wires, bent as in Diagram *Y* with straight ends as at *F* and a cross wire at the bottom, are built in the wall about three courses of bricks below the roof line, 18 in. apart, as indicated at *A*. The last course of brick finishing the roof line is cut to give the desired pitch, as shown, the wall continued to *C*, the cap flashing set and the parapet wall completed with coping.

The top of the brick wall is covered as shown from *D* to *E* with wires passing through the covering and secured as shown in Diagrams *V* and *Y*. This method holds the covering in position and also provides for expansion and contraction of the sheet metal.

Cornice and Balustrade Flashing—Outlet Drainage Tubes

Drawing No. 71

The method employed when terra cotta cornices and balustrades are flashed and the roof of the projecting cornice is drained by means of sheet metal tubes passing through the parapet wall to the main roof, is presented in Drawing No. 71.

In Fig. 1 is shown the main terra cotta cornice pitching toward the parapet wall. While the specifications are practically the same as for Drawing No. 70, here the cornice covering is hooked on the terra cotta drip and is prevented from slipping outward by the use of copper tie wire, inserted at every joint of the terra cotta cornice and secured as described in Diagram *Y*, Drawing No. 70.

An alternate method of securing the sheet metal covering is shown, one-third full size, in Fig. 2. In this case $\frac{1}{2}$ in. diameter holes, $1\frac{1}{2}$ in. deep, 18 in. apart, are provided in the face of

the upper member while the terra cotta is still in a plastic state. Before the covering is applied, lead expansion shields are inserted.

To prevent seepage through the parapet wall, the terra cotta coping is flashed as shown in Fig. 1, riveted every 12 in. through the standing lock. Seepage through the wall may also be prevented by the employment of the alternate method shown in Fig. 3. Here the center brick course is set edgewise and flashed with sheet metal as indicated from *A* to *B* in the drawing.

Fig. 4 is a sectional view of a terra cotta cornice with balustrade. After the wall has been carried up as high as *A-B* in Fig. 4, the center brick course is set edgewise and the full width of the wall covered. The balustrade is completed, a metal bar of either bronze or brass being used to secure the balusters.

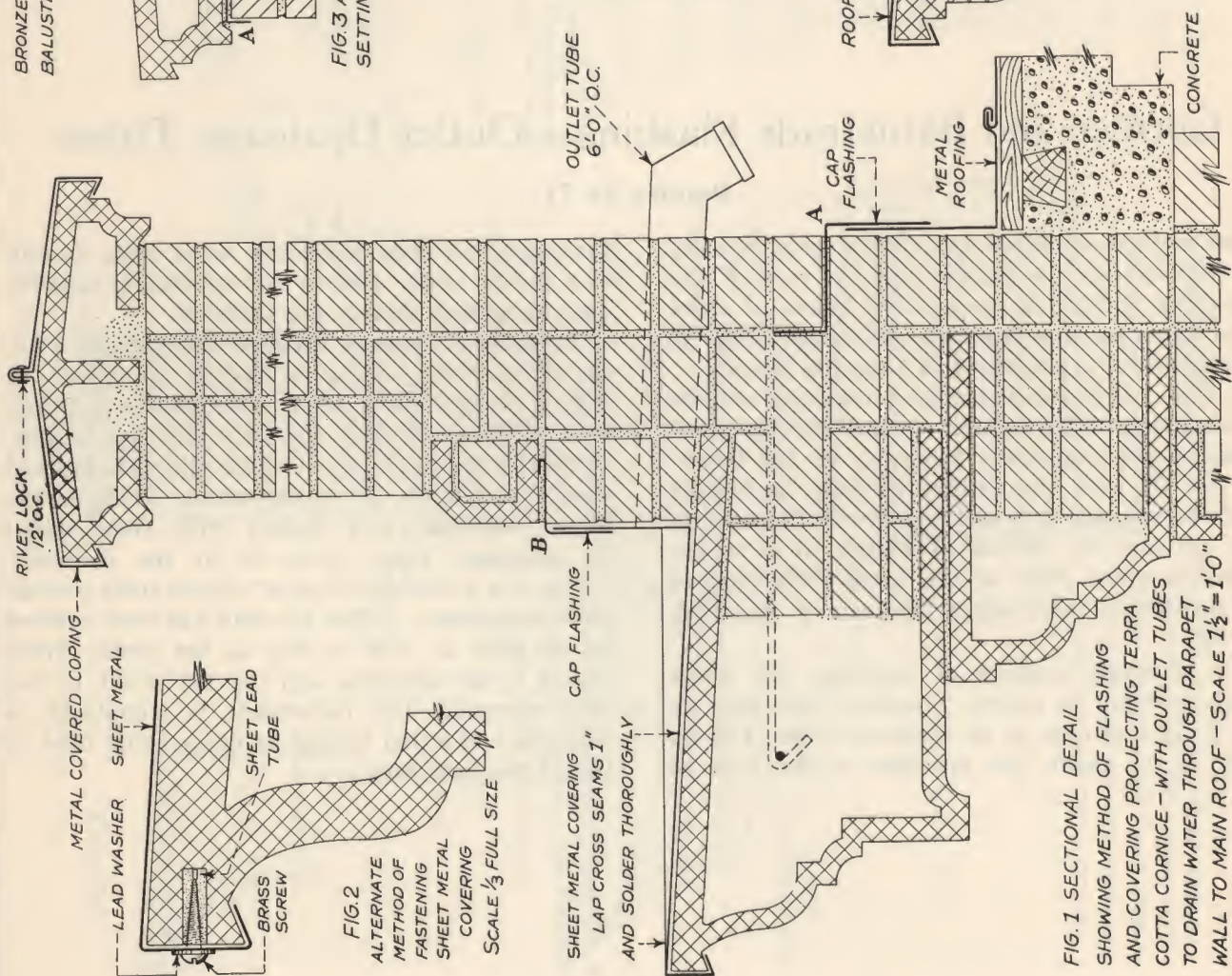


FIG. 2
ALTERNATE
METHOD OF
FASTENING
SHEET METAL
COVERING
SCALE $\frac{1}{3}$ FULL SIZE

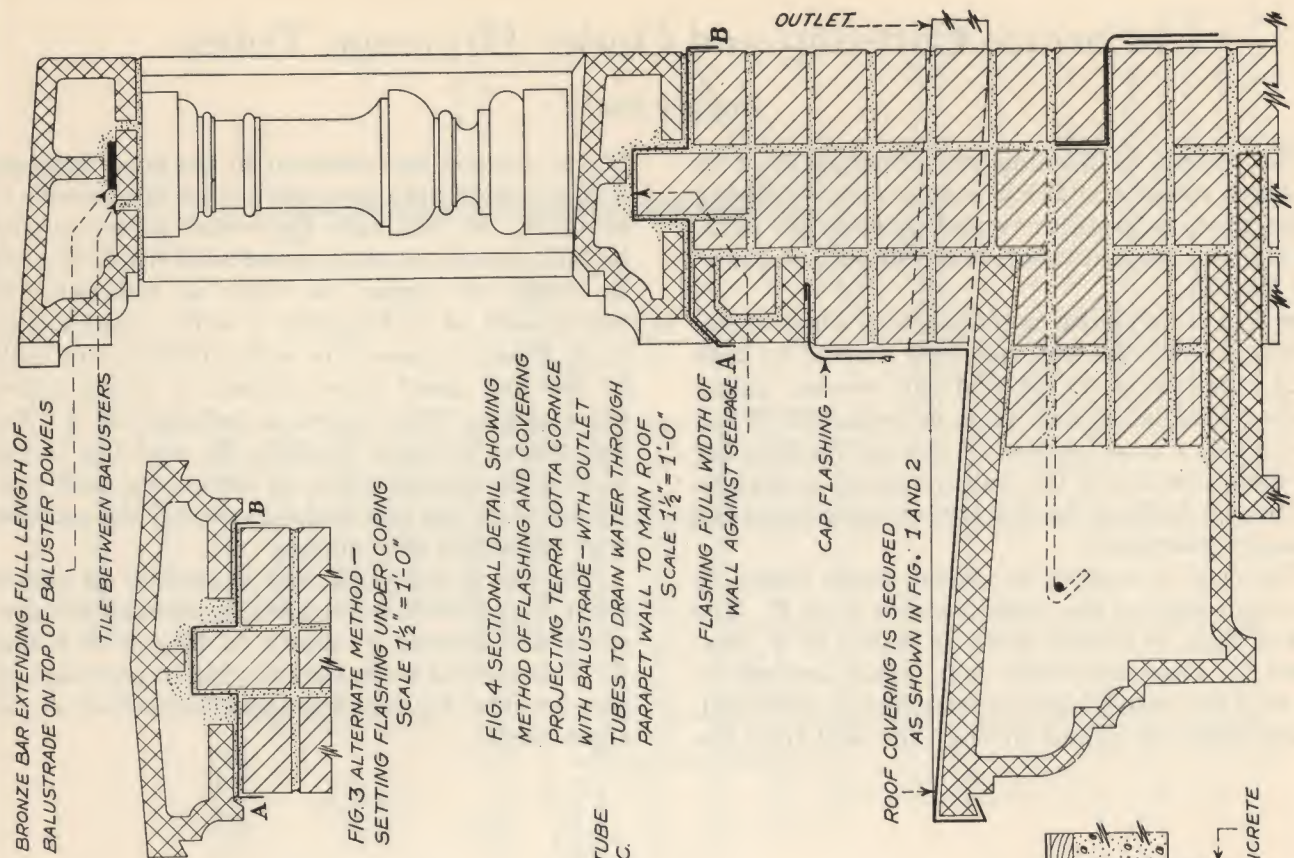


FIG. 3 ALTERNATE METHOD -
SETTING FLASHING UNDER COPING
SCALE $1\frac{1}{2}'' = 1'-0''$

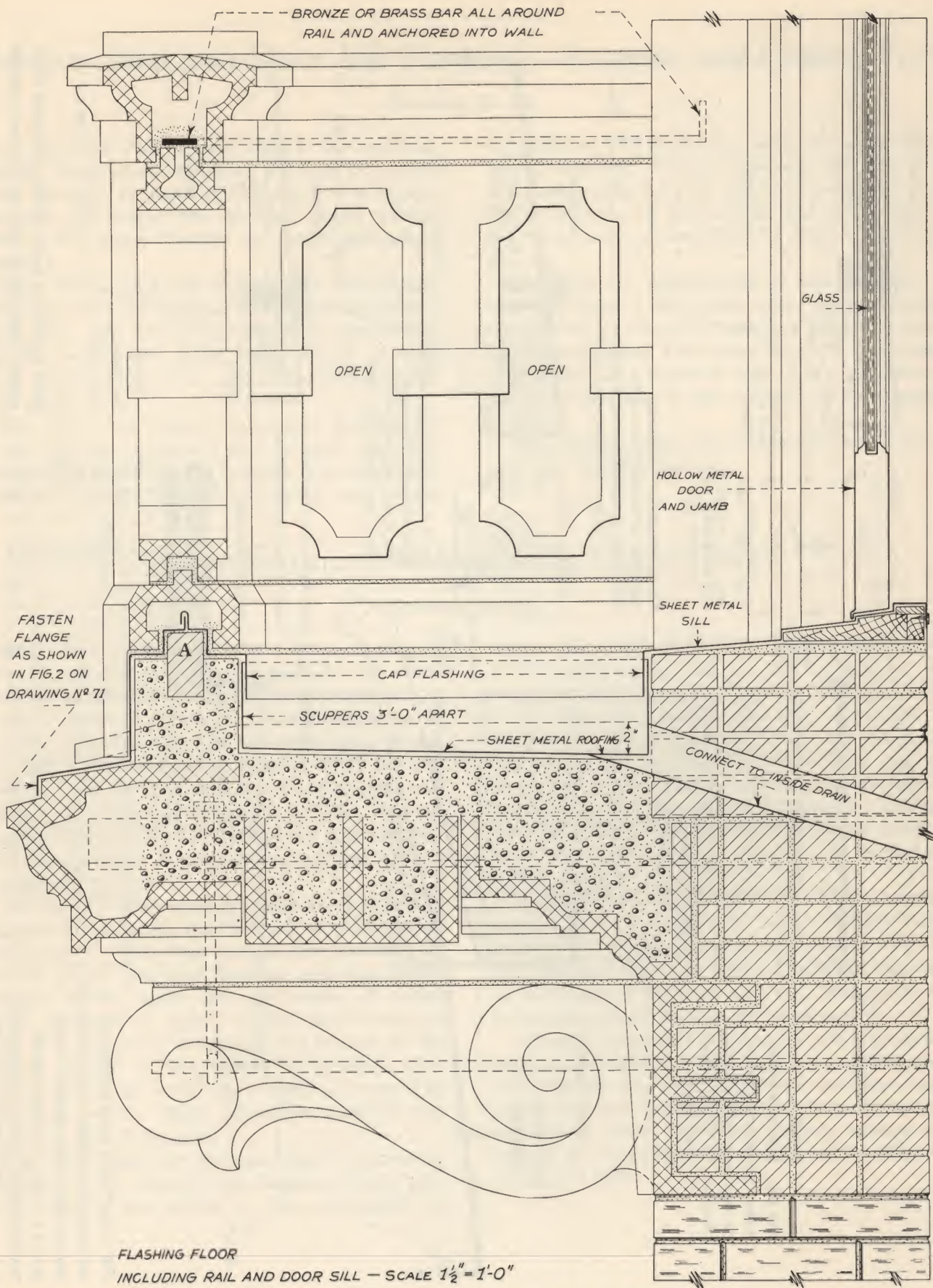
FIG. 4 SECTIONAL DETAIL SHOWING
METHOD OF FLASHING AND COVERING
PROJECTING TERRA COTTA CORNICE
WITH BALUSTRADE - WITH OUTLET
TUBES TO DRAIN WATER THROUGH
PARAPET WALL TO MAIN ROOF
SCALE $1\frac{1}{2}'' = 1'-0''$

FLASHING FULL WIDTH OF
WALL AGAINST SEEPAGE A

OUTLET

CAP FLASHING

ROOF COVERING IS SECURED
AS SHOWN IN FIG. 1 AND 2



DRAWING
NUMBER 72

BALCONY RAIL AND DOOR SILL FLASHING --
SCUPPER AND OUTLET TUBE

Balcony Rail and Door Sill Flashing—Scupper and Outlet Tube

Drawing No. 72

In Drawing No. 72 are shown the methods used for flashing and covering the floor of a terra cotta balcony. In work of this kind it is important that the mason and the sheet metal worker receive the same details to avoid misunderstanding.

Note that in this case the floor of the balcony pitches toward the building and connects to inside drain pipe. The roof is covered with sheet metal laid flat seam, with $\frac{1}{2}$ -in. locks, tinned on both sides, cleated every 8 in. and thoroughly sweated with solder.

The sill of the hollow metal door leading out to the balcony is flashed and covered, and also forms a cap flashing. The flashing under the terra cotta rail is bent and set as shown, and covers

the front as well as the two ends and connects to the sill flashing. The rail flashing also acts as a cap flashing on the roof side and is flanged over the terra cotta on the outside, and is secured to the terra cotta as described in Fig. 2, Drawing No. 71.

Provision for taking care of the overflow in case the outlet tube to the inner drain becomes stopped up, is made by inserting scuppers about 36 in. apart, about 2 in. above the roof. The insertion of part of a brick on edge in the concrete, as shown at A, forms a key over which the flashing is set.

This method with minor modifications may be used for a stone balcony.

Stone Cornice Flashing with Outlet Tube

Drawing No. 73

Drawing No. 73 shows how a stone cornice is covered and the covering fastened to the stone work, three alternate methods being presented.

Fig. 1 shows the method of flashing the top of the cornice and the wall of the main roof. When the wall on the roof side is erected to X, the cap flashing is built in and when the parapet wall reaches the height of Y on the outside, the cap flashing is laid to turn up behind the stone facing. This construction is used in connection with a promenade tile roof.

The stone cornice has an angular drip in the top member to which the covering is attached, as shown at A. The rear end of the covering is slipped under the cap flashing and the water drained to the main roof by means of outlet tubes, placed 6 ft. apart. If one large outlet is used, it is placed in the center and the top of the cornice graded to this point. To prevent slipping of the metal covering, it must be secured to the stone work. Three alternate methods are shown in Fig. 2, 3 and 4.

Fig. 2 indicates how the covering is secured by means of $\frac{1}{4}$ in. wide dovetail cleats. Holes, perfectly square, are drilled in the stone work as

shown, the width of the hole at the bottom equal to the width of the cleat at the bottom, for the easy insertion of cleat. The cleat projects about $\frac{3}{4}$ in. above the stone work and is secured in place with Portland cement. Holes are cut in the covering which is slipped over the cleat and the projecting flanges turned down, after the cement has hardened. Then raised buttons are soldered over the cleats. The hole or slot in the sheet is cut about $\frac{3}{4}$ in. long to permit free movement of the metal.

In the method shown in Fig. 3, a bolt is caulked into the stone work, then by means of washer and nut, the covering is secured. A plan view is given at the left of Fig. 3 in which 1 indicates the hole in the stone, 2 the bolt and nut, 3 the slot cut in the sheet and 4 the cap soldered over it.

A round head brass wood screw and washer are used in the method shown in Fig. 4. In this case, after the hole has been drilled into the stone, sheet lead tubes are inserted, and when wood screws are driven home, the lead expands against the side of the tapering hole and forms in effect an expansion bolt.

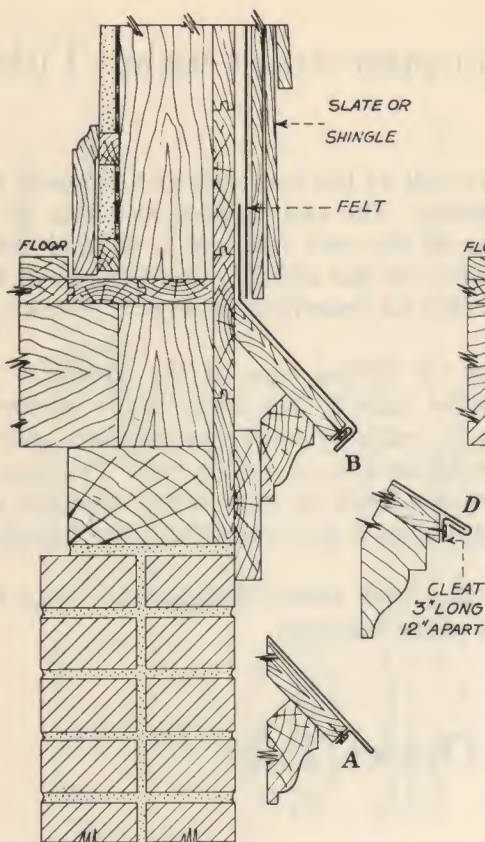


FIG 1 FLASHING WATER TABLE ON SLATE OR SHINGLE WALL - SCALE $1\frac{1}{2}" = 1'-0"$

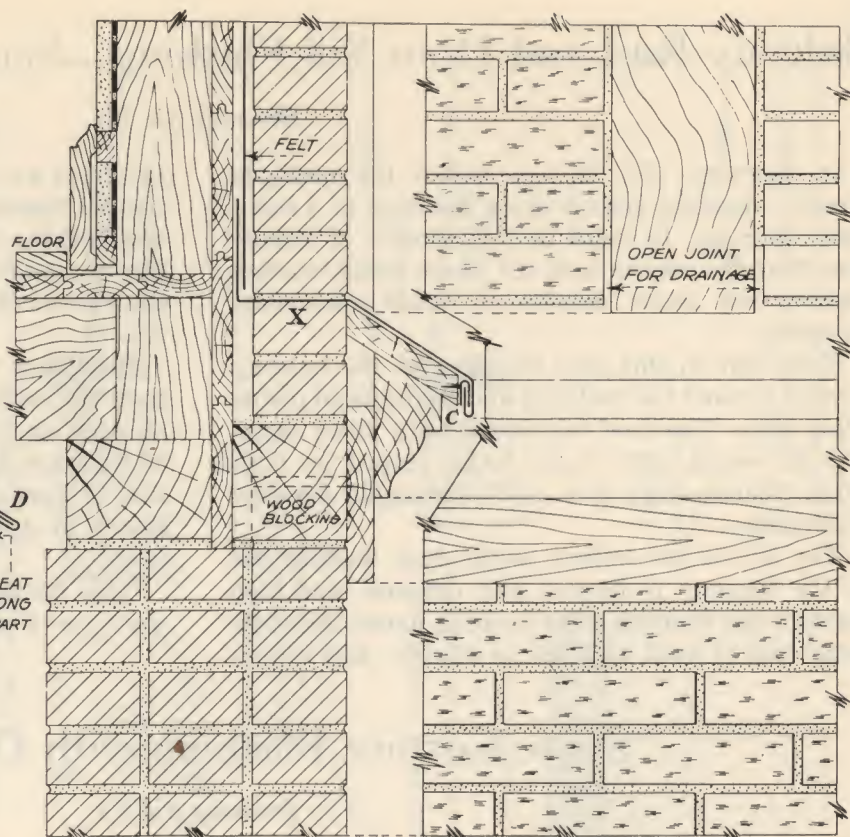


FIG. 2 FLASHING WATER TABLE ON BRICK VENEER WALL - SCALE $1\frac{1}{2}" = 1'-0"$

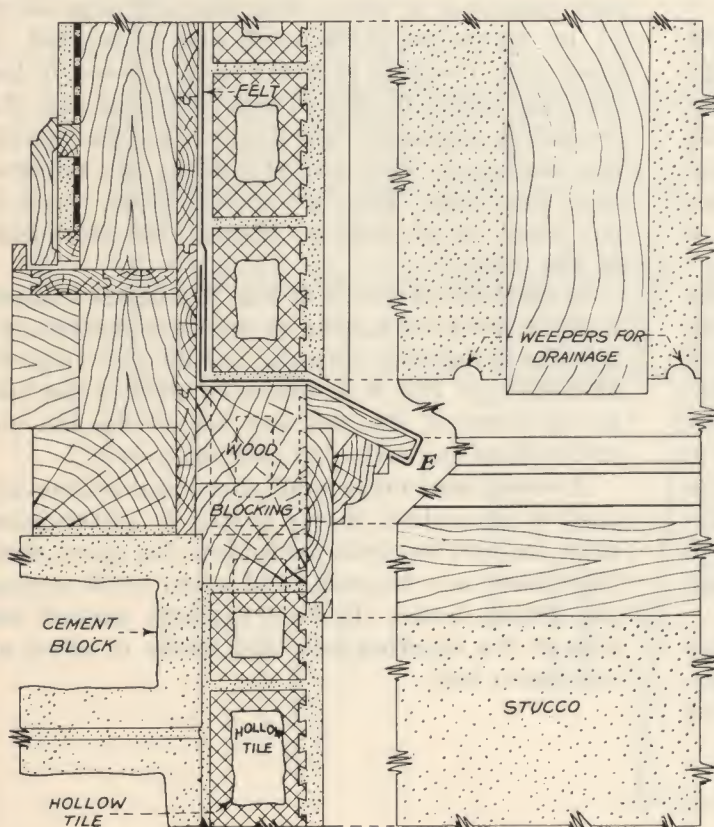


FIG. 3 FLASHING WATER TABLE ON HOLLOW TILE AND STUCCO WALL - SCALE $1\frac{1}{2}" = 1'-0"$

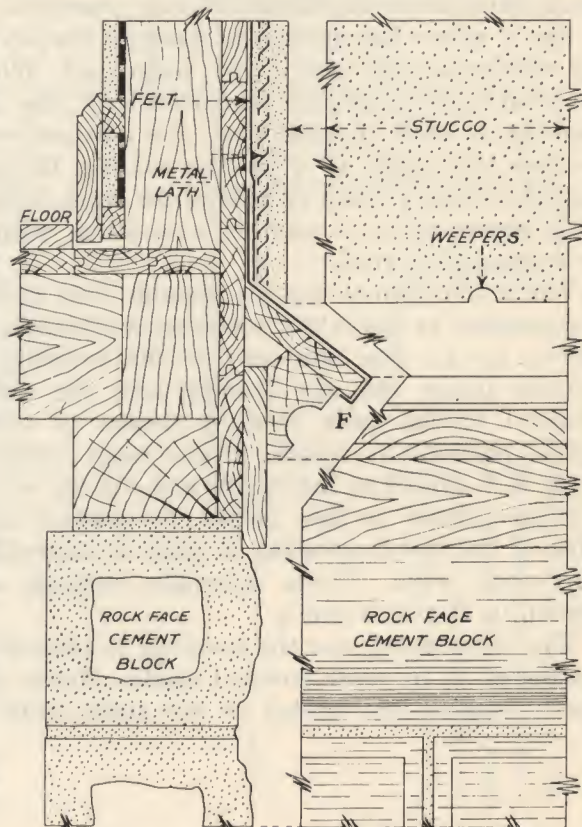


FIG. 4 FLASHING WATER TABLE ON METAL LATH AND STUCCO WALL - SCALE $1\frac{1}{2}" = 1'-0"$

Water Table Flashing on Slate, Brick Veneer and Stucco Walls

Drawing No. 74

The method of flashing a water table on four different wall constructions, is presented in Drawing No. 74.

Fig. 1 indicates the flashing when the wall is covered with either slate or shingles. The flashing is formed with a projecting double edge as shown at *A*, the edge *A* is malleted down, as shown at *B*, and the nail heads covered to prevent the nails from drawing out. The waterproofing felts on side walls under slate or shingles are then applied over the flashing as shown.

The water table flashed through brick veneer is presented in Fig. 2. Wood blocking is built in as the masonry progresses, and when the wall is as high as *X*, the wooden water table is completed so that the flashing is applied in one piece. The waterproof felt is laid over flashing and the wall continued. The finish at *C* is made by means of a cleat or eaves strip, more clearly shown at *D*.

When half-timbered work is used with brick veneer, the side joints of the lower course of brick, where it adjoins the woodwork, is left open to allow for drainage of any seepage, as indi-

cated in the partial elevation presented in Fig. 2.

Fig. 3 shows the flashing of the water table when the wall is of hollow tile and stucco, and the specification is identical with brick veneer, with the option of the flashing hooking over the upper member of the wash, as at *E*.

Brads are placed through the bottom of the lower edge about 3 ft. apart to hold the flashing in position until the masonry is continued. All cross seams are well soldered. Weepers for draining the seepage are placed in the stucco at the flashing line every 2 or 3 ft. as shown in the partial elevation.

In Fig. 4 is shown how the water table is flashed when the construction of the wall is of metal lath and stucco. The flashing is hooked over the lower edge of the wash as shown at *F* and secured with a few brads until the cross seams are soldered. Over the vertical flashing, the felt is placed and over the felt the wire lath is secured and the stucco completed. Weep holes are placed as shown in the partial elevation about 3 ft. apart.

Window Frame Flashings on Shingle or Brick Veneer Walls

Drawing No. 75

In Drawing No. 75 are presented the methods of flashing the window sill, jamb and head on slate, shingle and brick veneer wall constructions.

The flashing of the window sill when the wall is of either slate or shingle is described in Fig. 1. Note that felt is first laid over the sheathing and, after the slate or shingles are applied, the window frame is set, the metal flashing being secured to the under side of the sill with a water bar, as shown. Single flashings are also laid in with the courses of slate or shingles against the projecting side of the jamb as shown in the partial elevation and more clearly presented in Fig. 2, which represents a section through the jamb.

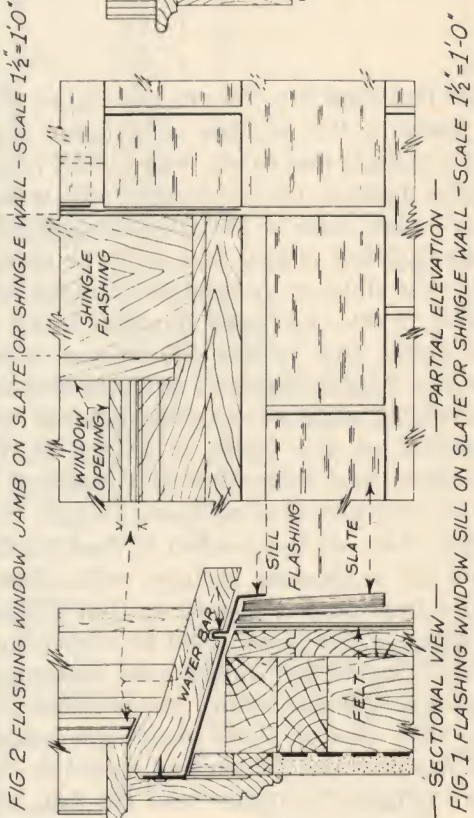
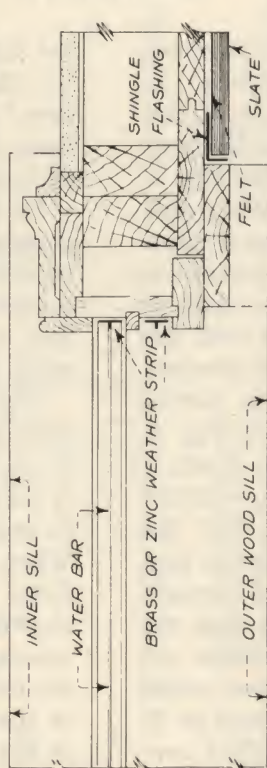
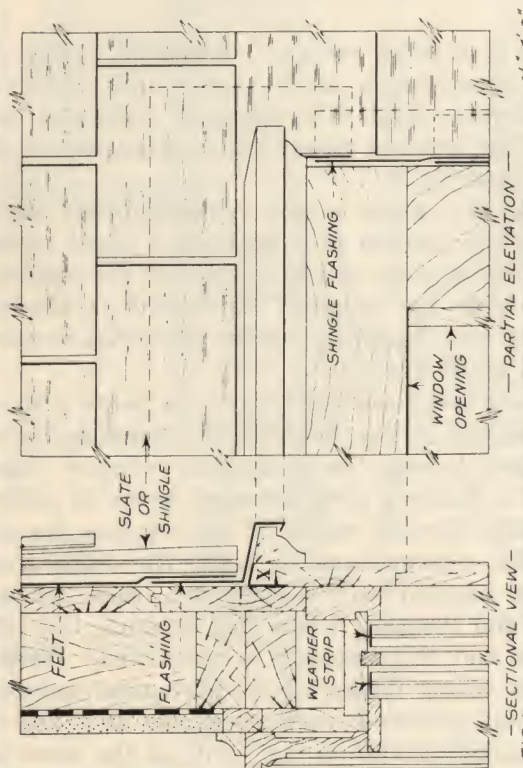
Fig. 3 shows the method of flashing the window head on a slate or shingle wall. Note that the projecting head is flashed so that it hugs the first member of the wood mold as shown and forms a drip. This is not nailed, and assuming that the caps are flashed before the window frames are set, then two or three cleats are soldered under the flashing and drawn and nailed as shown at *X*. Care is taken to insure that the felt, applied over the sheathing, laps the metal flashing the full height as shown.

The method of putting in the sill flashing when

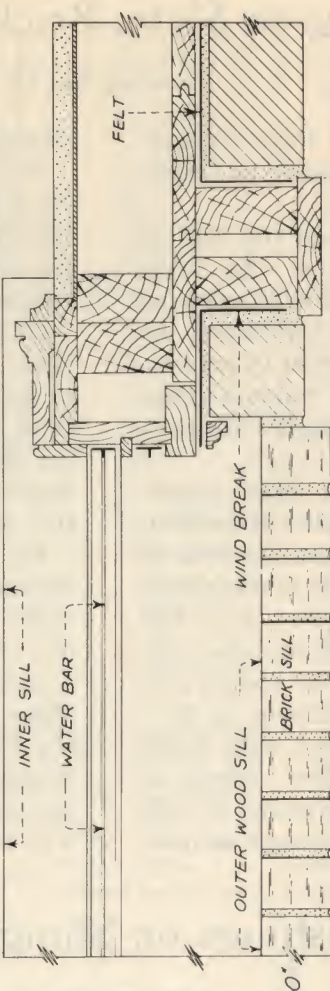
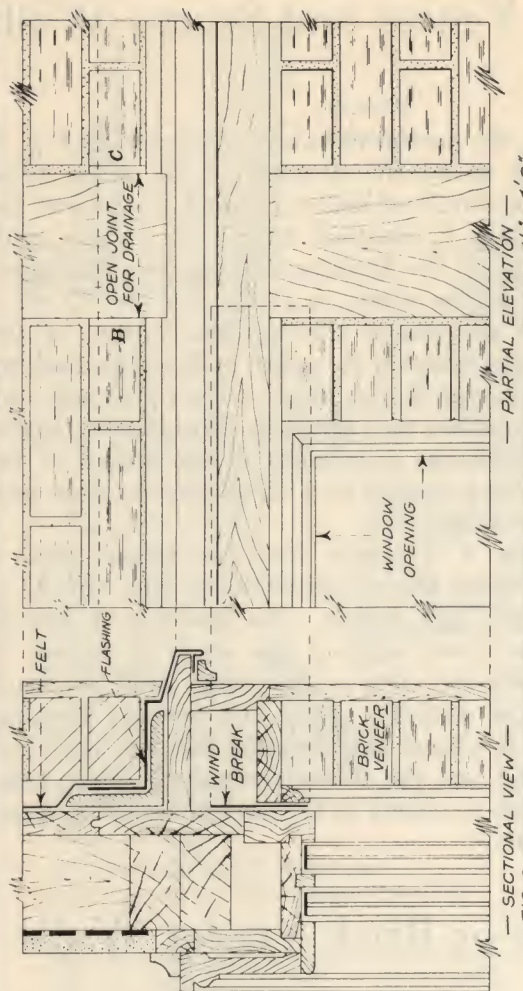
the wall is of brick veneer, is indicated in Fig. 4. In this construction brick veneer and half-timbered work is used. The flange is nailed to the back of the sill and allowed to overlap the brick wall at least $\frac{3}{4}$ in.

In Fig. 5 is given a section through the jamb showing the method of putting in a sheet metal wind break or angle the full height of the window frame. Note the layer of felt which is always laid over the sheathing before the brick veneer work is started.

The window head flashing on a brick veneer wall is shown in Fig. 6. After the window frame is set and before the projecting window head is built, a flashing strip or wind break is nailed in position the full width of the window frame. When the window head is built, the angle iron lintel is painted with asphaltum, then set as shown, and flashed. Upon this flashing the felt overlaps and the masonry is continued. Where the brick veneer intersects the horizontal member of the half-timbered work, as shown at *B* and *C* in the partial elevation, the joints at the sides of the lower course of brick are left open for drainage.



— PARTIAL ELEVATION —
FIG 1 FLASHING WINDOW SILL ON SLATE OR SHINGLE WALL — SCALE 1 1/2" = 1'-0"



— PARTIAL ELEVATION —
FIG 4 FLASHING WINDOW SILL ON BRICK VENEER WALL — SCALE 1 1/2" = 1'-0"

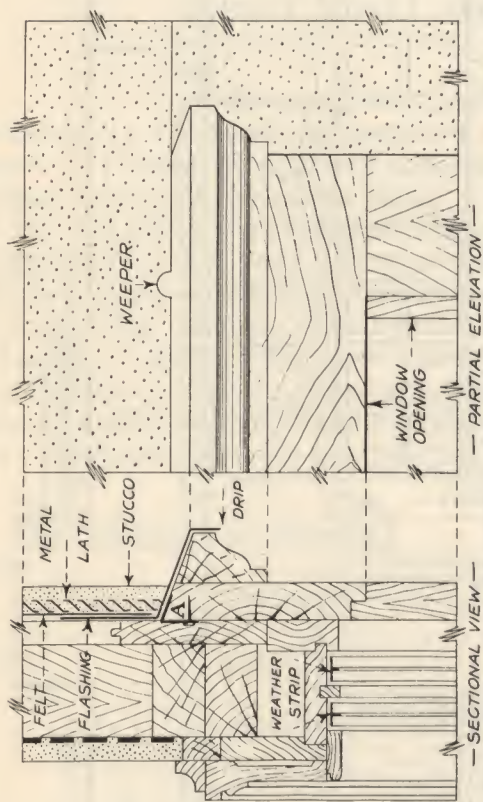


FIG. 3 FLASHING WINDOW HEAD ON METAL LATH AND STUCCO WALL — SCALE $1\frac{1}{2}'' = 1'-0''$

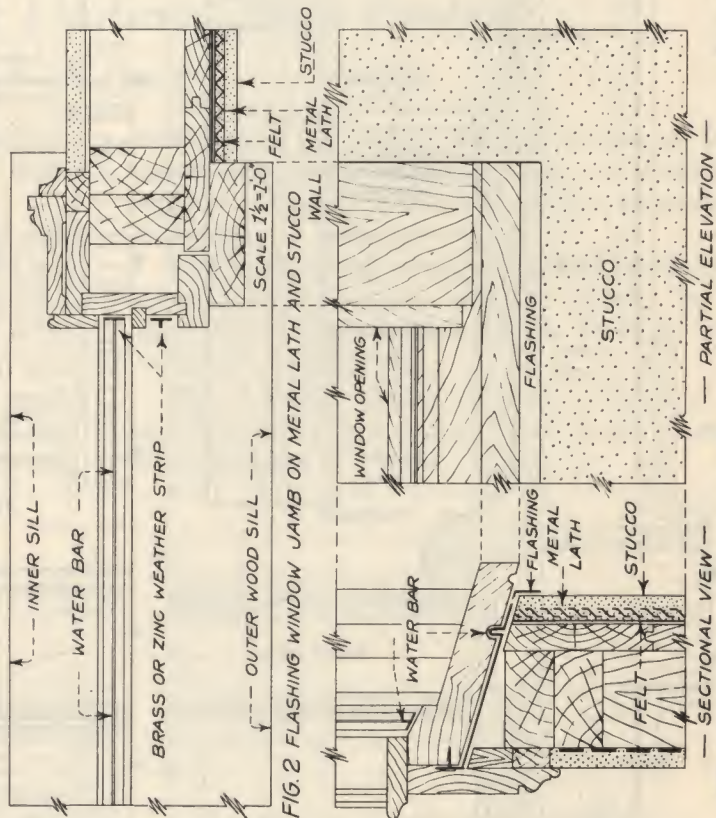


FIG. 2 FLASHING WINDOW JAMB ON METAL LATH AND STUCCO WALL — SCALE $1\frac{1}{2}'' = 1'-0''$

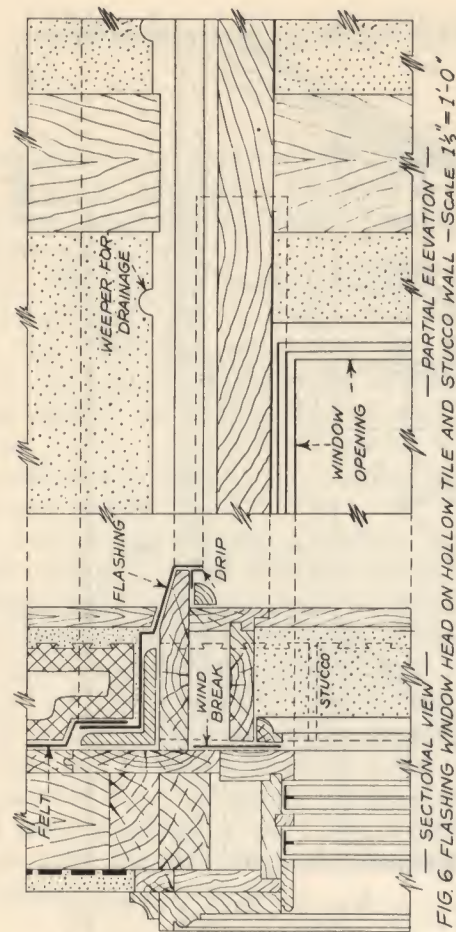


FIG. 6 FLASHING WINDOW HEAD ON HOLLOW TILE AND STUCCO WALL — SCALE $1\frac{1}{2}'' = 1'-0''$

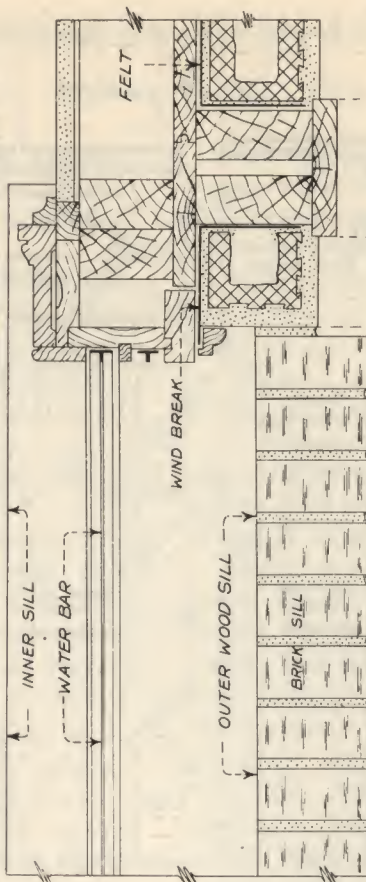


FIG. 5 FLASHING WINDOW JAMB ON HOLLOW TILE AND STUCCO WALL — SCALE $1\frac{1}{2}'' = 1'-0''$

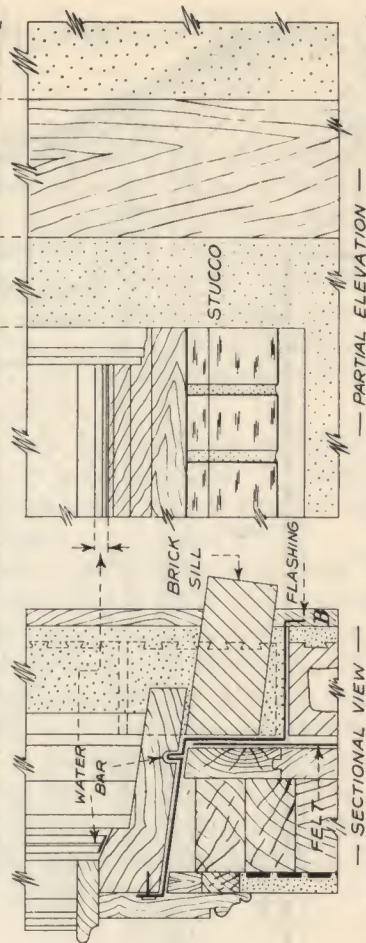


FIG. 4 FLASHING WINDOW SILL ON HOLLOW TILE AND STUCCO WALL — SCALE $1\frac{1}{2}'' = 1'-0''$

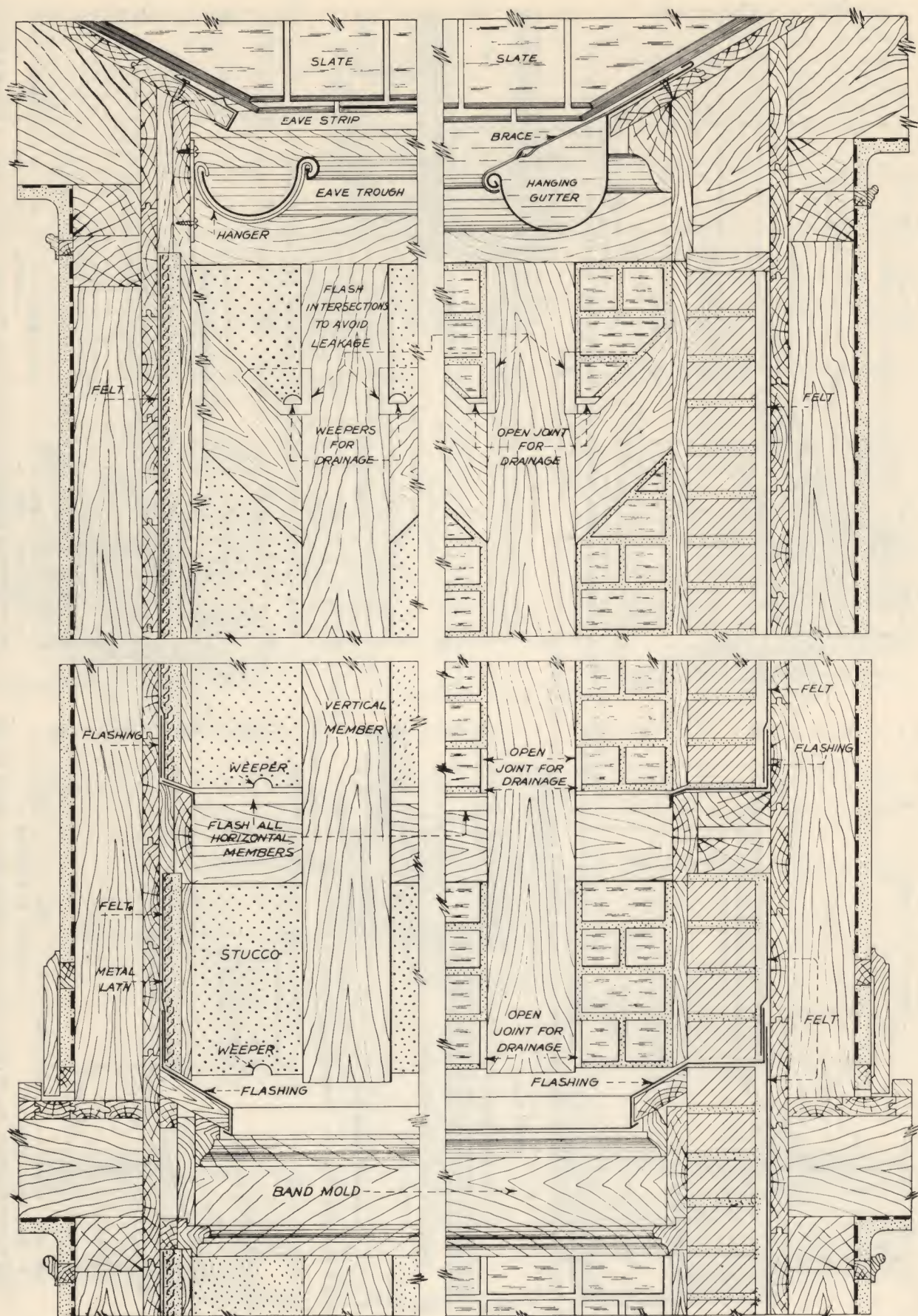


FIG. 1 METHOD OF FLASHING ON STUCCO WALL — SCALE $1\frac{1}{2}'' = 1'-0''$ — FIG. 2 METHOD OF FLASHING ON BRICK VENEER WALL

DRAWING
NUMBER 77

BAND MOLD AND TIMBERED WALL
FLASHING

Window Frame Flashing on Metal Lath, Stucco Walls

Drawing No. 76

The method of applying flashings to window sill, jamb and head when the walls are of stucco on either metal lath or hollow tile, is presented in Drawing No. 76.

Fig. 1 shows the flashing applied to the sill when metal lath and stucco are used for the wall. Note the water bar which sets into the groove cut in the bottom of the wood sill, the flashing being carried up behind the sill and nailed as shown.

A section through the jamb and window frame is shown in Fig. 2.

In Fig. 3 is presented a section through the window head on metal lath and stucco wall. The flashing over the window head is nailed along the front edge if desired, allowing it to extend below the upper member to form a drip. A better method of fastening is to solder two or three cleats to the under side of the flashing as at A and then nail to the frame at the back. Of course, this must be done before the window frame is set. It is good practice to have the weepers in the stucco over the window head flashing to allow any moisture to drain out.

Fig. 4 shows a sectional view and partial elevation of a flashed window sill on a hollow tile and stucco wall. In this case, before the brick sill is laid, the flashing is set over the last course of hollow tile, which projects the thickness of the stucco as at B, forming a water bar, and flanging and nailing to the back of the wood sill as shown. After the flashing is in place, the brick sill is completed.

A section through the jamb on a metal lath and stucco wall is given in Fig. 5. Note the metal wind break or angle placed the full height of the window frame.

In Fig. 6 is shown the flashing and metal wind break for a window head when the wall is of hollow tile and stucco. In this construction, the angle iron lintel is first set, then the window head flashed with metal, care being taken to cover the flashing with a heavy coat of asphaltum where it comes in contact with the angle iron. Over this flashing the felt is placed. The drip shown is held in place by a quarter round wood mold. Weepers for drainage are placed at intervals as indicated in the front elevation.

Band Mold and Timbered Wall Flashing

Drawing No. 77

Drawing No. 77 shows the method of flashing required in connection with half-timbered work on either stucco or brick veneer walls.

In Fig. 1 is shown the procedure when the wall is constructed of metal lath and stucco. The top of the band mold as well as all tops of horizontal and intersecting members of half-timbered work are flashed, as shown. The wood members usually shrink away from the stucco and brick work and leave small openings through which rain can enter. The flashing extends up under the felt not

less than 2 in. Where the half-timbering intersects and forms pockets, these are flashed as shown. Weepers for drainage are provided as indicated.

Where an eaves trough is used, the eaves are covered with an eaves strip as shown, the cant strip being bent on same in the form of an inverted V as indicated.

Fig. 2 shows similar flashing, but on a wall constructed of frame and brick veneer, weepers are provided.

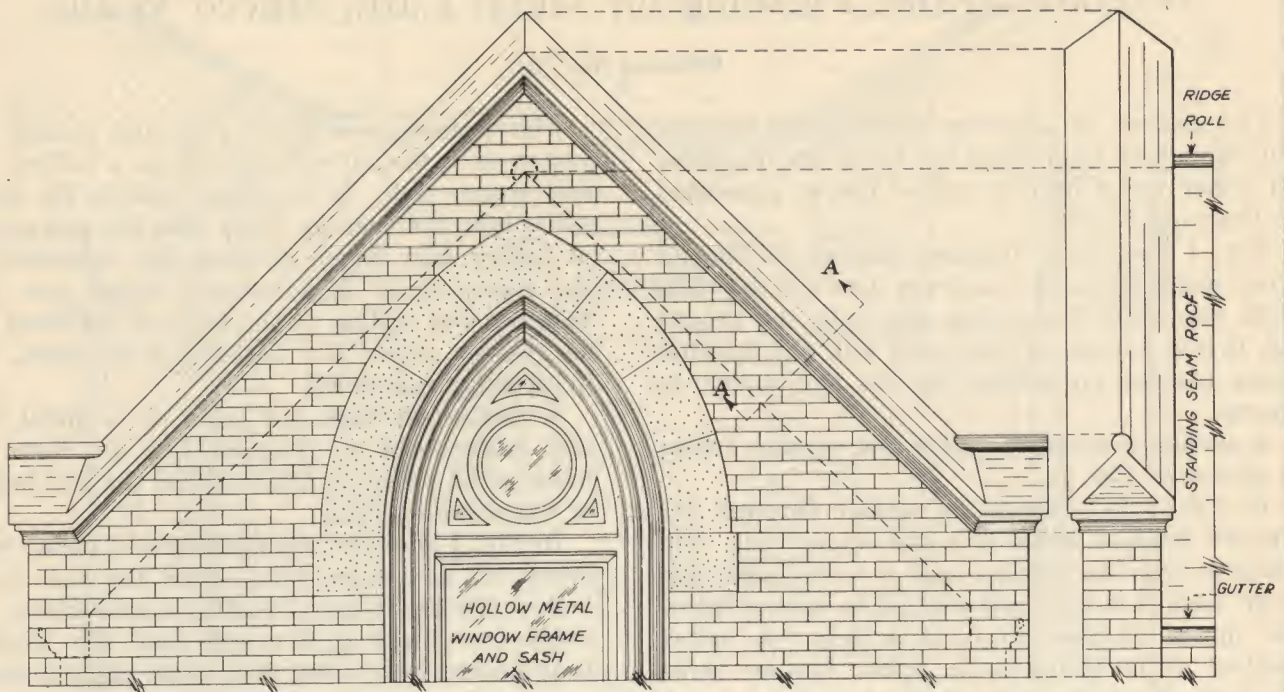


FIG. 1 FRONT AND SIDE ELEVATIONS OF SHEET METAL COPING WITH HEAD BLOCKS, OVER BRICK GABLE WALL

— SCALE $\frac{3}{8}'' = 1'-0''$ —

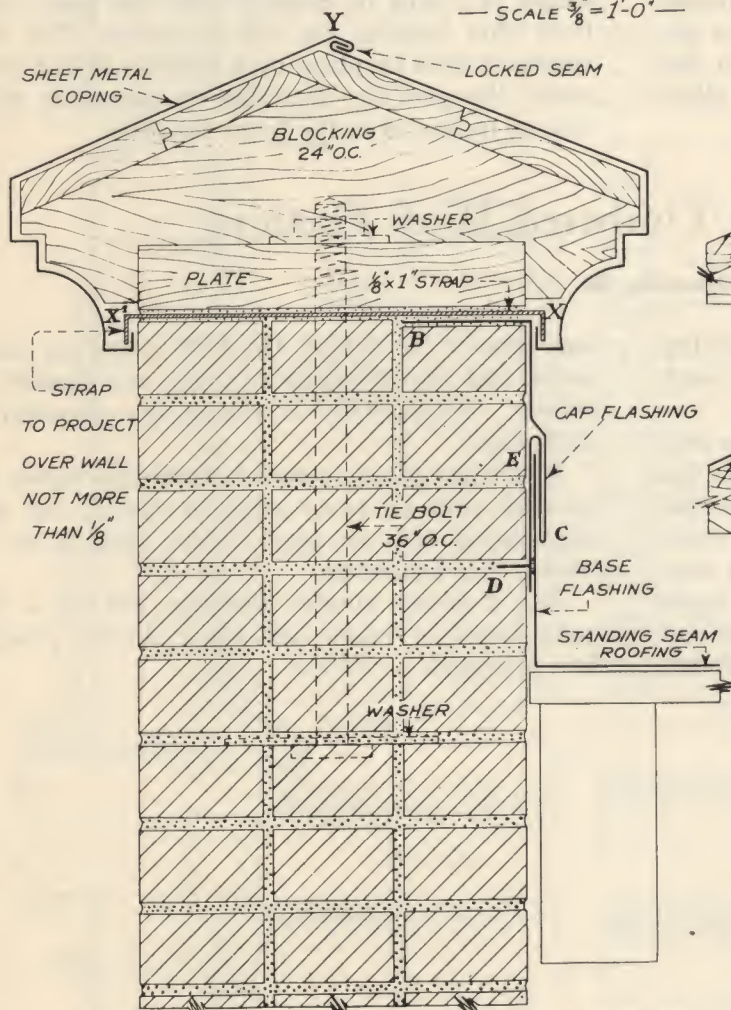


FIG. 2 SECTION ON LINE A-A IN FIG. 1 — SCALE $2'' = 1'-0''$

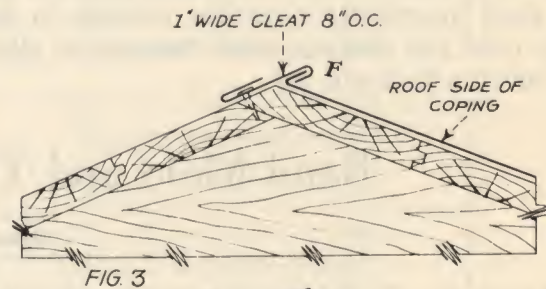


FIG. 3

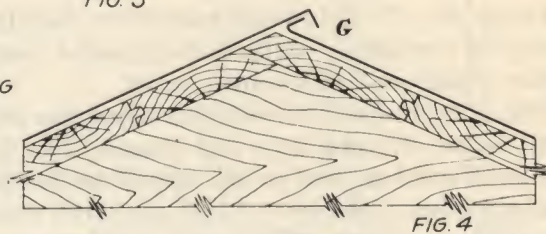


FIG. 4

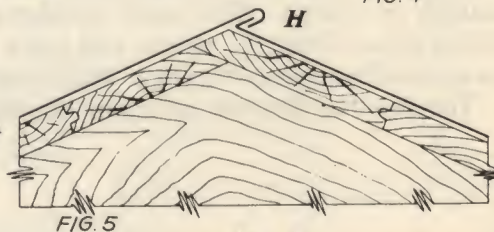


FIG. 5

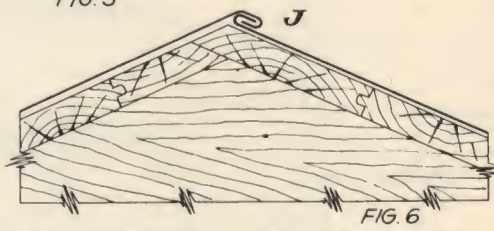


FIG. 6

FOUR OPERATIONS IN LOCKING THE COPING

Coping over Brick Gable Wall

Drawing No. 78

Drawing No. 78 shows the construction of a sheet metal coping with head blocks on a brick gable wall. Leakage is prevented by means of the drip at the bottom.

In Fig. 1 is presented a front and side elevation of a gable coping with head blocks. A detailed method of construction on line A-A in Fig. 1 is shown in Fig. 2. When the wall has been finished to a point as indicated by *B*, a sheet metal cap flashing is applied. This is formed as shown by *B-C-D-E* and is laid on the wall in a continuous length, parallel with the pitch of the roof. The flange projects below the double fold or pocket at *C* and is nailed at intervals to the brick joints as shown at *D*.

To make a storm-proof connection the base flashing is slipped into the pocket as indicated at *C-E*. Straps made of $\frac{1}{8}$ x 1 in. bar metal, with

ends turned down at right angles are laid on the wall, 18 in. on centers, before wood plate is secured in place with the bolts built in the wall as shown. On this plate wood blocks of the required size and shape are nailed and sheathed as shown.

The roof side of the metal coping is first hooked under the strap as at *X* and the upper lock turned up slightly more than a right angle, as shown at *F* in Fig. 3. The opposite half of the coping is then hooked under the strap as at *X'* in Fig. 2, with the upper lock turned down as at *G* in Fig. 4 and turned under as indicated at *H*, Fig. 5, and finished as shown at *J*, Fig. 6. The lock when in the position shown at *H* in Fig. 5 is painted with thick white lead and then malleted down. All cross seams are riveted and well soldered.

Molded Coping and Wall Covering

Drawing No. 80

Fig. 1 to 5, inclusive, in Drawing No. 80 show the construction of molded sheet metal coping applied on a wood base. Fig. 1 indicates the coping connected to a vertical sheet metal wall covering, in case it is required that the entire wall on the roof side be covered with sheet metal. If the wall extends over 18 in. above the roof line, it is advisable to apply the cover with standing seams, securing the vertical seams in the joints of the brick work by means of wall nails and cleats spaced 8 in. apart. This standing seam covering acts as a cap flashing over the base flashing, as shown in Fig. 1.

At the sheathing line an edge is turned outward and secured with cleats as shown at *A* in

Fig. 2. The roof of the coping is locked to the side as shown at *B* in Fig. 1.

There are two methods by which the molded face may be secured to the roof of the coping. One method is shown at *C* in Fig. 3 and is finished as indicated at *E* in Fig. 1. The other is shown in Fig. 4 where a double edge forms a support on the sheathing to which it is nailed. The roof covering is locked to the projecting edge *D* and turned down. Fig. 5 shows a coping where the wall is not over 18 in. above the roof line and the base flashing or roof sheets are turned up and slipped into a pocket formed on the inside edge of the cover sheet, which is held in place by nailing to the wood plate at *F*.

Sheet Metal Copings on Horizontal Walls

Drawing No. 81

Three types of sheet metal coping on horizontal walls secured to wood plates by different methods, are presented in Drawing No. 81.

Fig. 1 shows a type secured to the underside of the wood plate by brass screws and brass washers. The angles at *A* and *A* are bent slightly more than called for in the profile so that when the coping is pressed over the wood plate it snaps in place and the flanges at *B* and *B* hug the wall.

In Fig. 2 is presented a simplified alternate method in which case the edge of the sheet metal is folded back on itself then turned outward at an

angle of about 30 deg. which stiffens the lower edge and forms a drip edge.

Fig. 3 shows another type of coping secured to the wood plate by blind nailing. A continuous strip of metal, folded back on itself with the double edge turned outward at an angle of 30 deg., is nailed in place to which the coping is locked.

When the coping is being formed, the flange is bent as at *H* in the upper diagram, then the edges turned under as shown at *F* which gives rigidity and forms a drip edge.

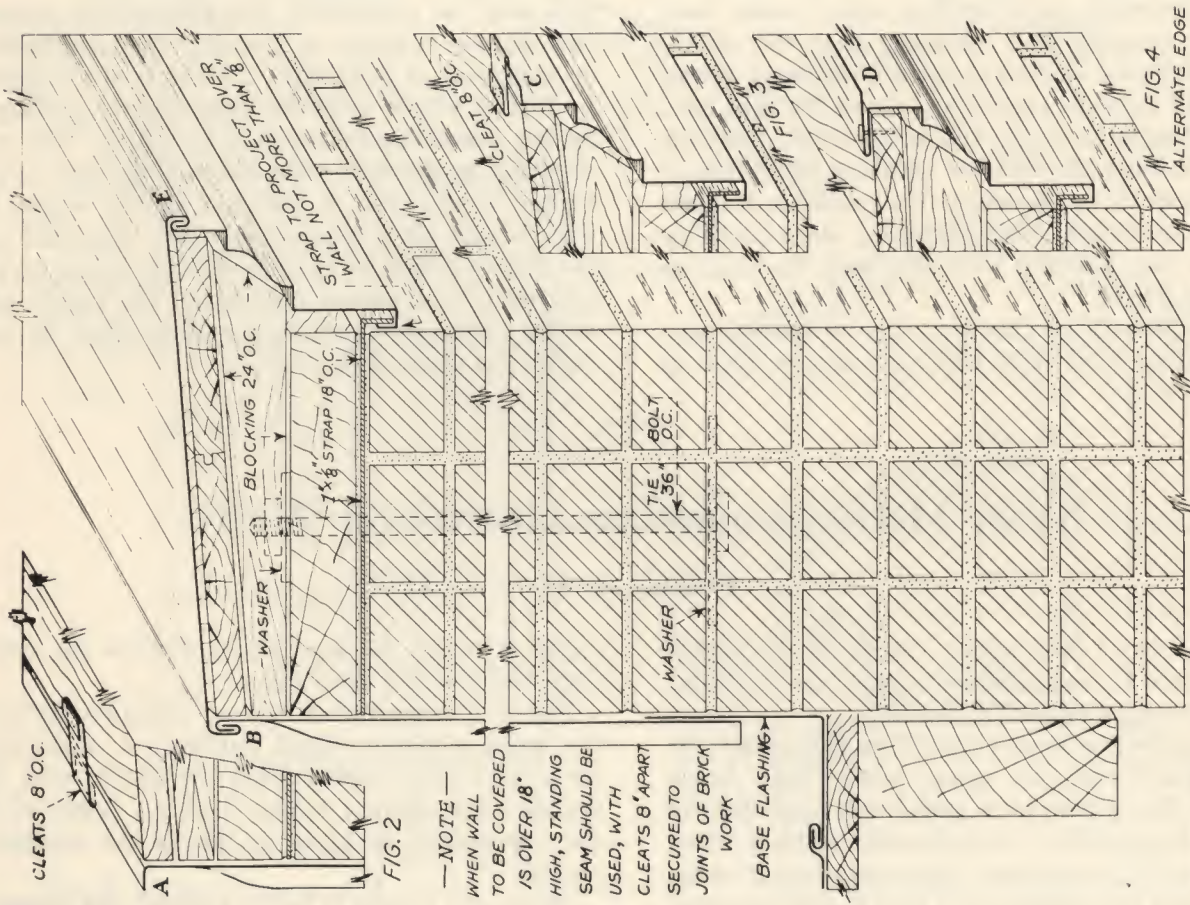


FIG. 1 METHOD OF CONSTRUCTING MOLDED SHEET METAL COPING, LOCKED TO
VERTICAL STANDING SEAM WALL COVERING

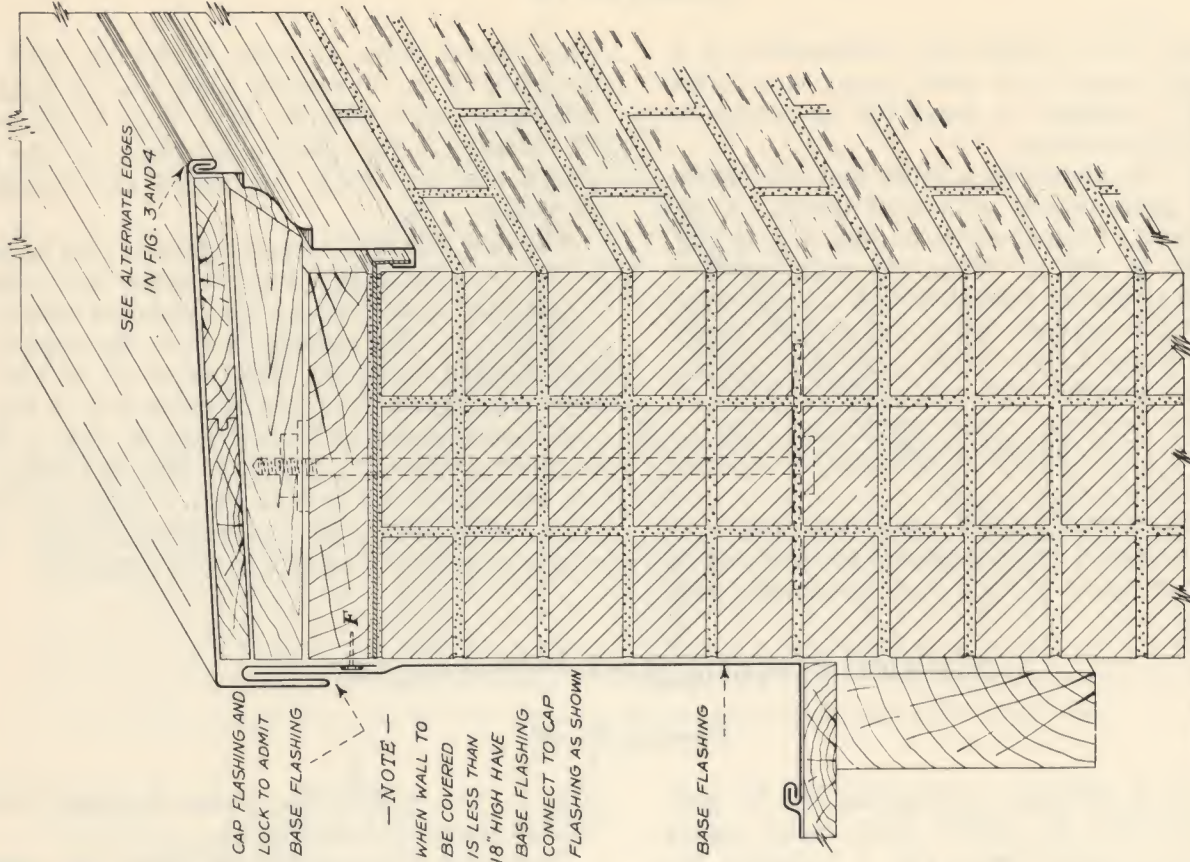


FIG. 5 METHOD OF CONSTRUCTING MOLDED SHEET METAL COPING
— WITH COMBINED CAP FLASHING — SCALE 2'-1'-0' —

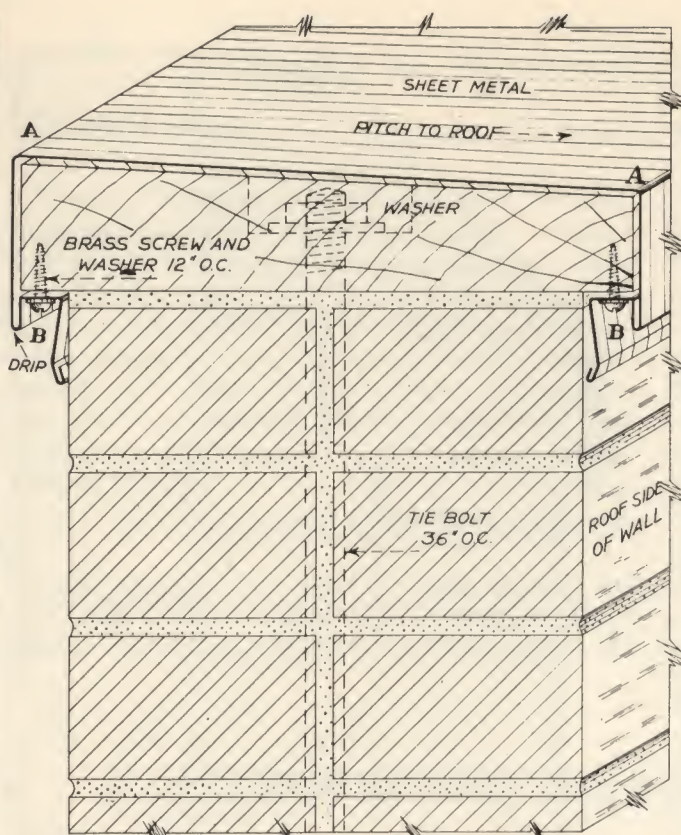


FIG. 1 SHEET METAL COPING — SECURED WITH BRASS SCREWS
— SCALE — ONE THIRD FULL SIZE —

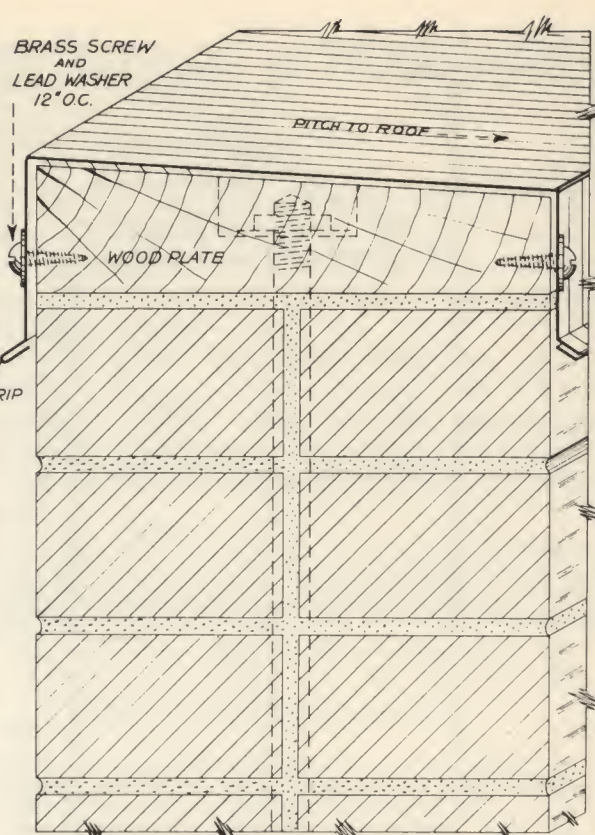


FIG. 2 SHEET METAL COPING — ALTERNATE METHOD
— SCALE — ONE THIRD FULL SIZE —

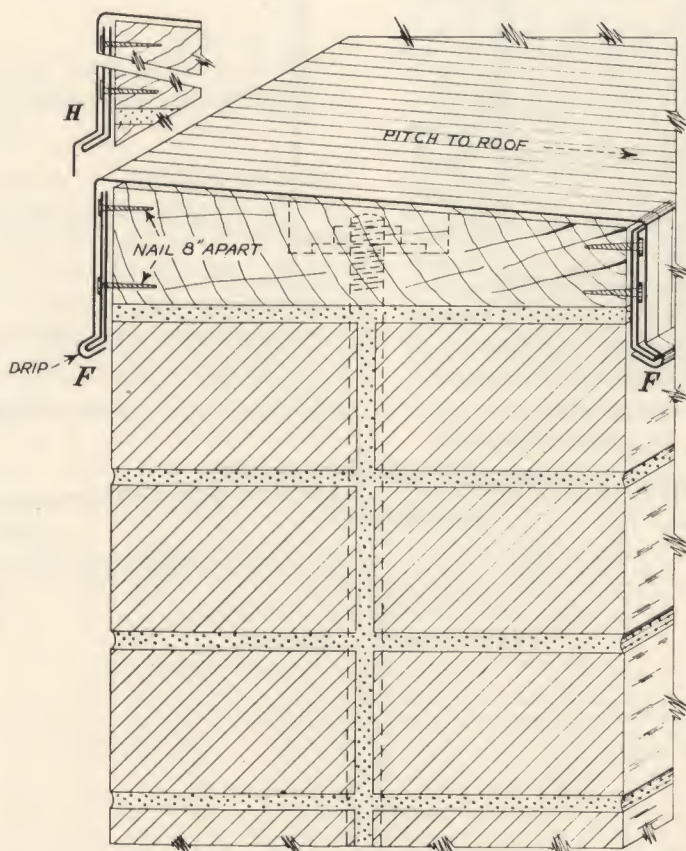


FIG. 3 SHEET METAL COPING — ALTERNATE METHOD
— SCALE — ONE THIRD FULL SIZE —

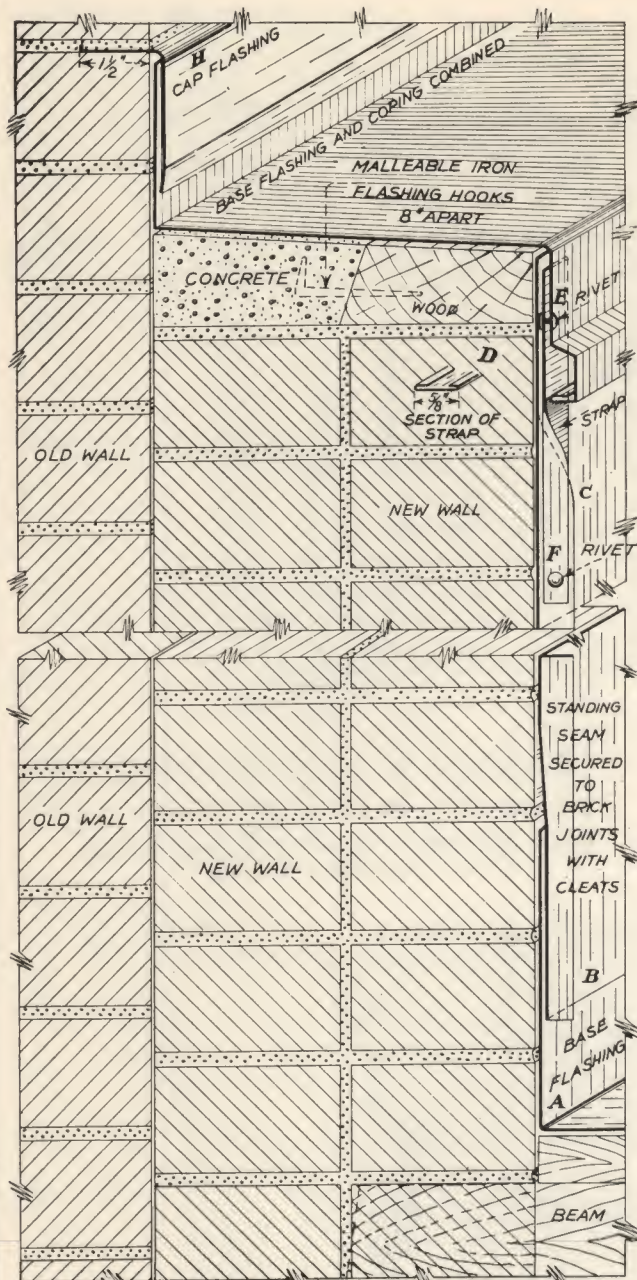


FIG. 1 SHEET METAL COPING ON NEW WALL BELOW
OLD WALL
SCALE -3\"=1'-0"

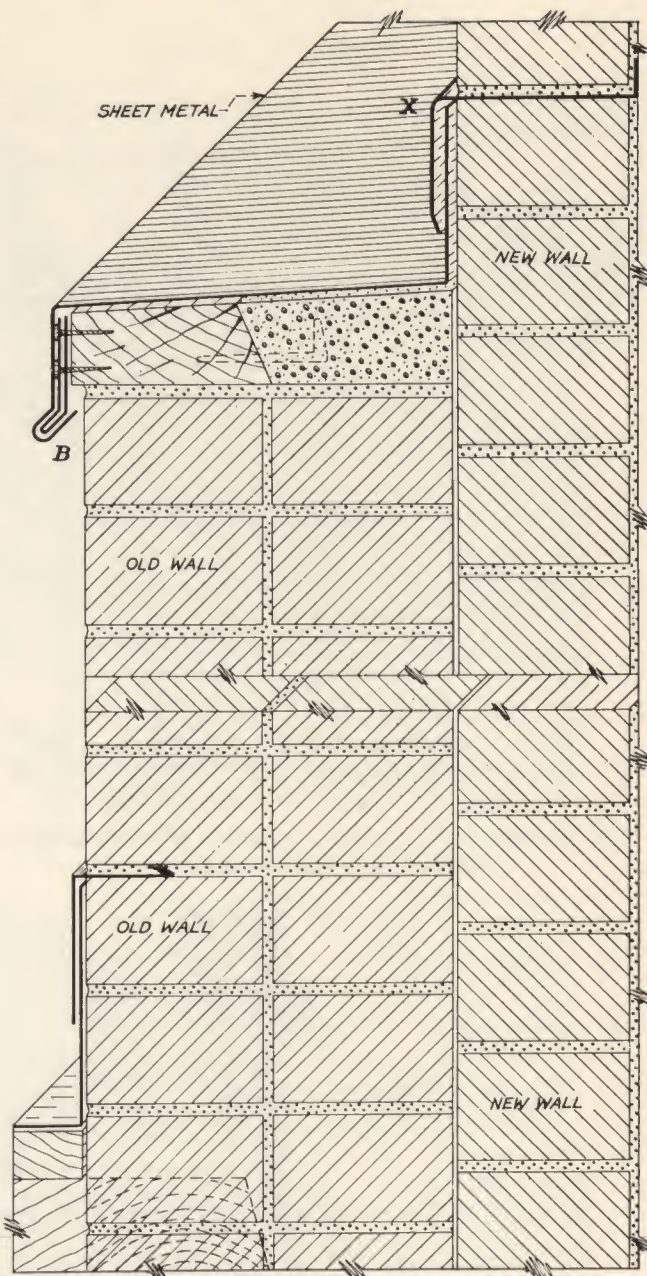
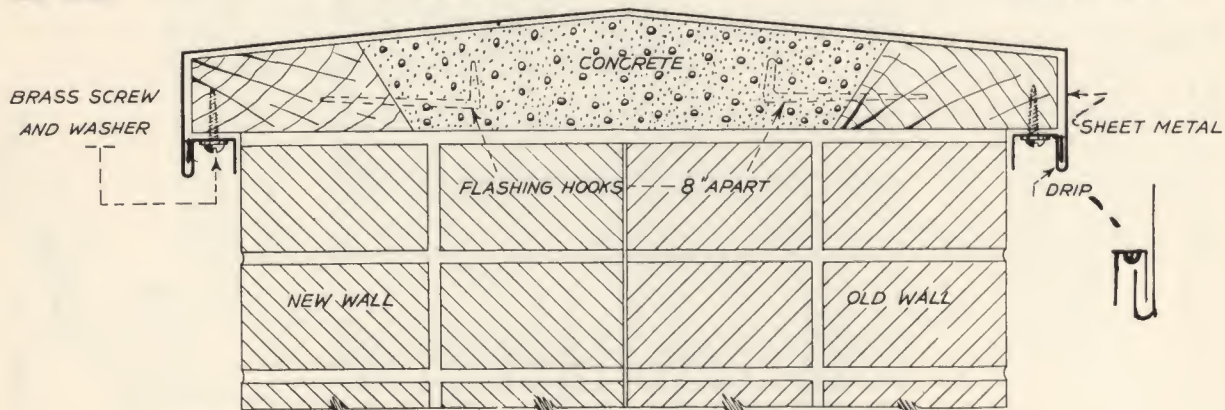


FIG. 2 SHEET METAL COPING ON OLD WALL BELOW NEW WALL
SCALE -3\"=1'-0"



— FIG. 3 SHEET METAL COPING OVER OLD AND NEW WALLS — SCALE 3\"=1'-0"

Coping at Adjoining Old and New Walls

Drawing No. 82

Drawing No. 82 indicates three types of coping set over old and new walls when the walls adjoin. Fig. 1 shows the construction when the new wall is stopped at a point below the old wall. The base flashing *A* is first laid. The standing seam siding overlaps the base flashing as at *B*. The wood plate is set in place with flashing hooks driven in the edge about 8 in. apart as shown, after which the concrete is poured so that the pitch of the coping is toward the roof. At the upper end of the wall covering the standing seam is flattened as shown at *C*.

Before applying the siding, cleats similar to *D* are riveted to the coping at *E*, spaced so as to permit riveting to the standing seam as shown at

F. The mortar joint in the old wall, about 4 in. above the coping, is dug out $1\frac{1}{2}$ in. and cap flashing *H* inserted and secured in place with wall nails or lead plugs, and the joint pointed up with elastic cement.

Fig. 2 shows the construction when the new wall is carried above the old wall. In this case, the cap flashing *X* is built in as the masonry progresses and a coping of the form shown is secured to the continuous double folded strip as indicated at *B*.

In Fig. 3 is shown the construction when the coping is to cover old and new walls built to a common level and needs no further description.

Corrugated Roofing and Siding on Wood Structure

Drawings No. -1A-1B

The methods of applying corrugated iron roofing and siding on wood structure are presented in Drawings No. 1A, 1B

Drawing No. 1A shows a detailed section through the eaves on the line *D-D* in Fig. 2, Drawing No. 1. Note the form of the eaves mold, with a pocket at the lower part to receive the corrugated siding. When securing the conductor, hinged conductor fasteners are employed as shown, fastened to the siding with two galvanized round head wood screws to each side flange.

In Drawing No. 1B, Fig. 8, presents the detail through the window head. Note the covering of the head with a drip at the bottom and a water table at *A* to shed the water.

Fig. 9 is a section through the window sill. In

this case the entire sill is covered as shown with a combination drip and pocket at *B* in which the siding is placed. A section through the window jamb is given in Fig. 10. Note how the jamb is formed with a waterlock at *C*. In Fig. 11 a section through the siding at the base of the building is shown. A concrete base is employed and is flashed as indicated along the baseboard. A drip is provided at the bottom and a flashing runs up behind the corrugated siding. The conductor is secured at the base with a galvanized hinged conductor fastener.

A section through the corner casing is shown in Fig. 12, with pockets to receive the corrugated siding.

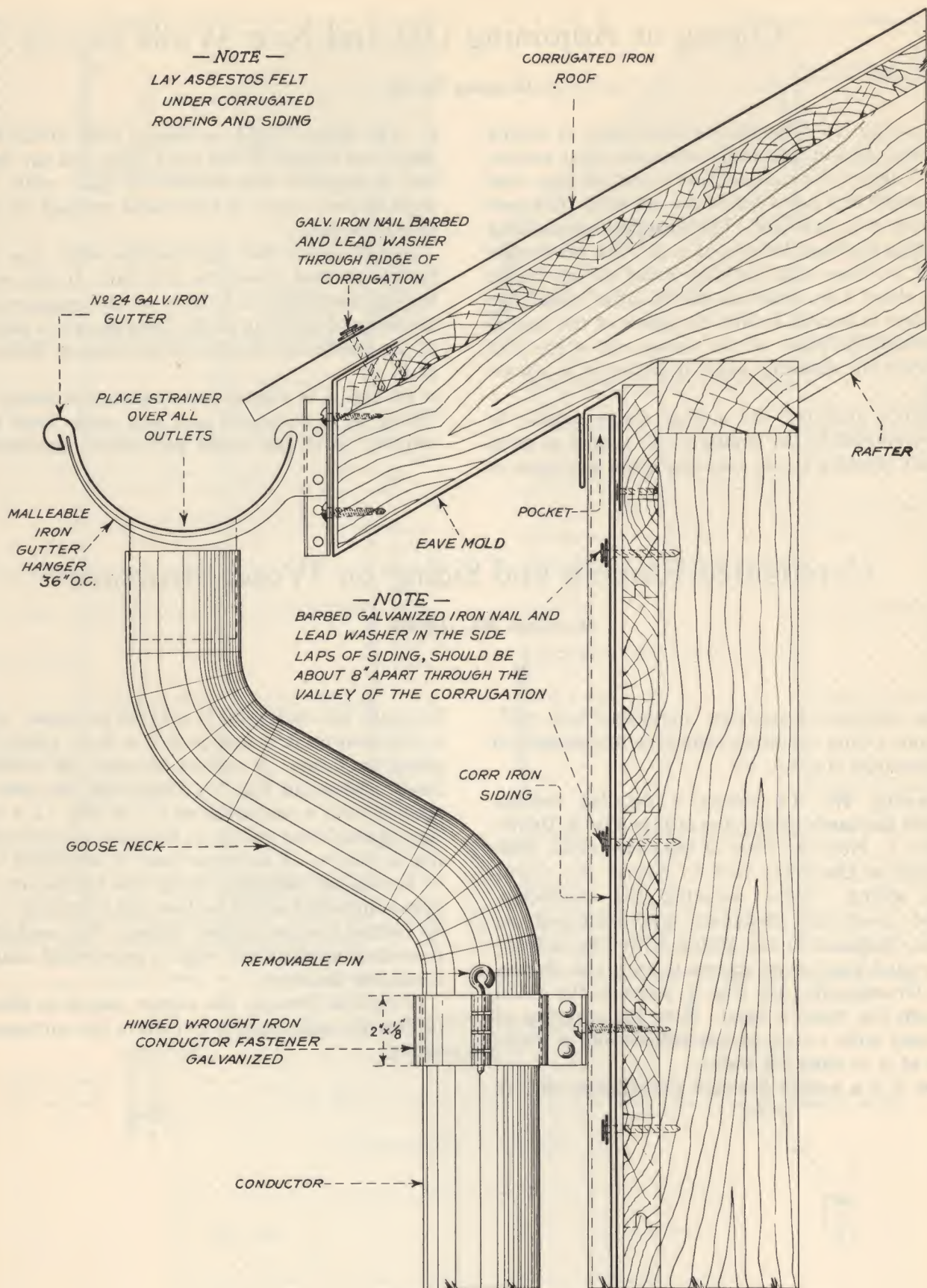


FIG. 7 SECTION ON LINE D-D IN FIG. 2 ON DRAWING NO 1
— SCALE 3" = 1'-0" —

DRAWING
NUMBER

1A

CORRUGATED ROOFING AND SIDING ON
WOOD STRUCTURE

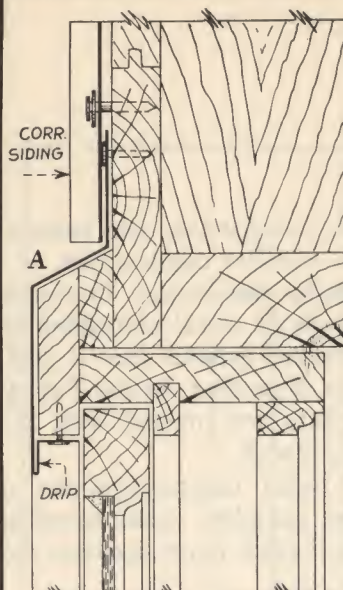


FIG. 8 SECTION ON LINE E-E
IN FIG. 2 ON DRAWING N° 1

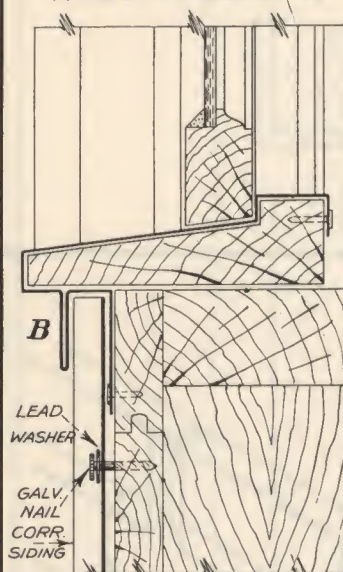


FIG. 9 SECTION ON LINE F-F
IN FIG. 2 ON DRAWING N° 1

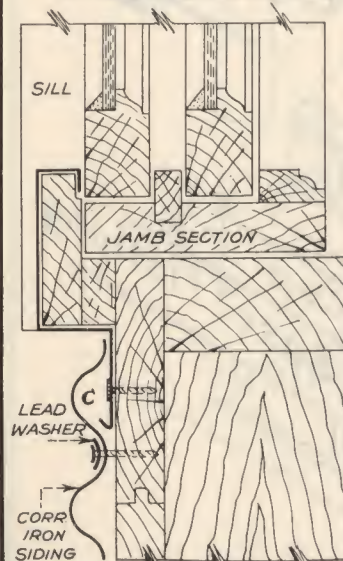


FIG. 10 SECTION ON LINE J-J
IN FIG. 2 ON DRAWING N° 1

—NOTE—
LAY ASBESTOS
FELT UNDER
CORRUGATED ROOF
AND SIDING

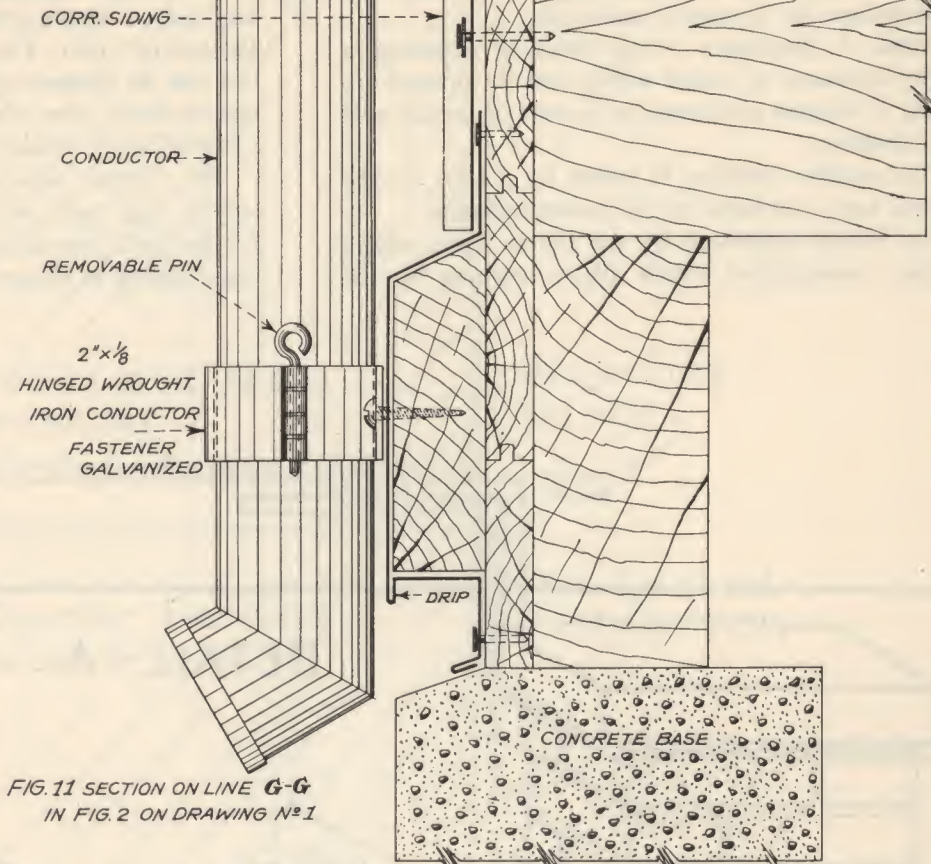


FIG. 11 SECTION ON LINE G-G
IN FIG. 2 ON DRAWING N° 1

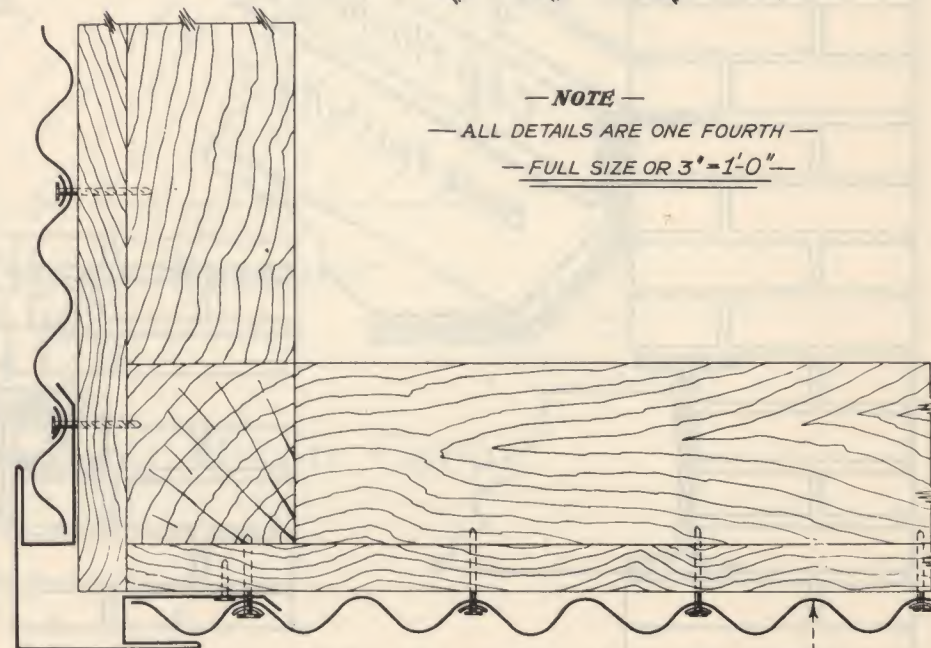


FIG. 12 SECTION ON LINE H-H IN FIG. 2 ON DRAWING N° 1

—NOTE—
— ALL DETAILS ARE ONE FOURTH —
— FULL SIZE OR 3'-1'-0" —

DRAWING
NUMBER

1B

CORRUGATED ROOFING AND SIDING ON
WOOD STRUCTURE

Special Details

The detail drawing below and the three drawings which follow show cap and base flashing practices submitted by sheet metal contractors. Also the construction for a scuttle and curb.

Detail A illustrates a cap flashing exposing a single thickness of metal which can be opened up should it become necessary to re-roof or install new base flashing.

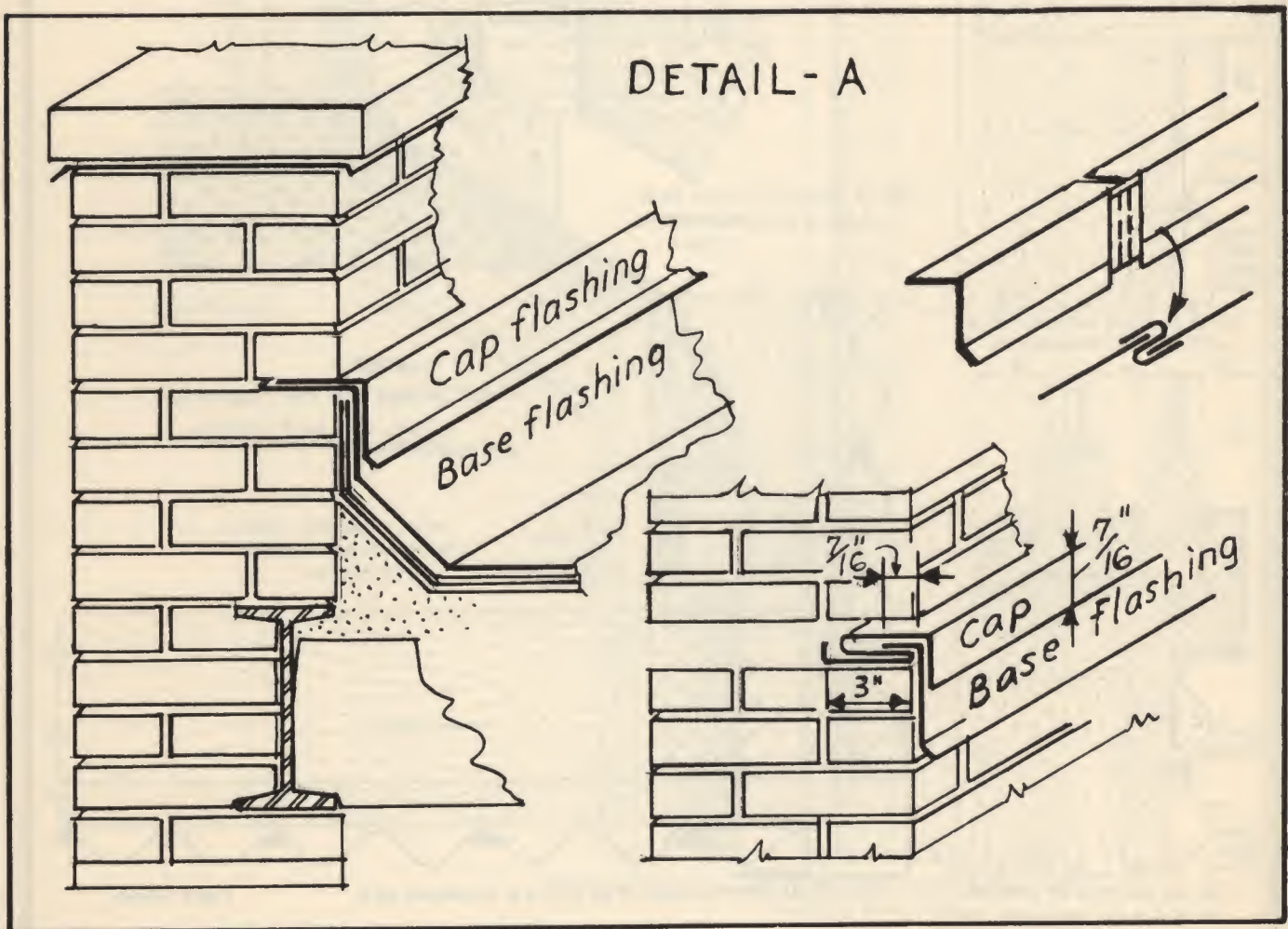
This counter flashing is joined by S-slips on the vertical face—no locks on the horizontal face.

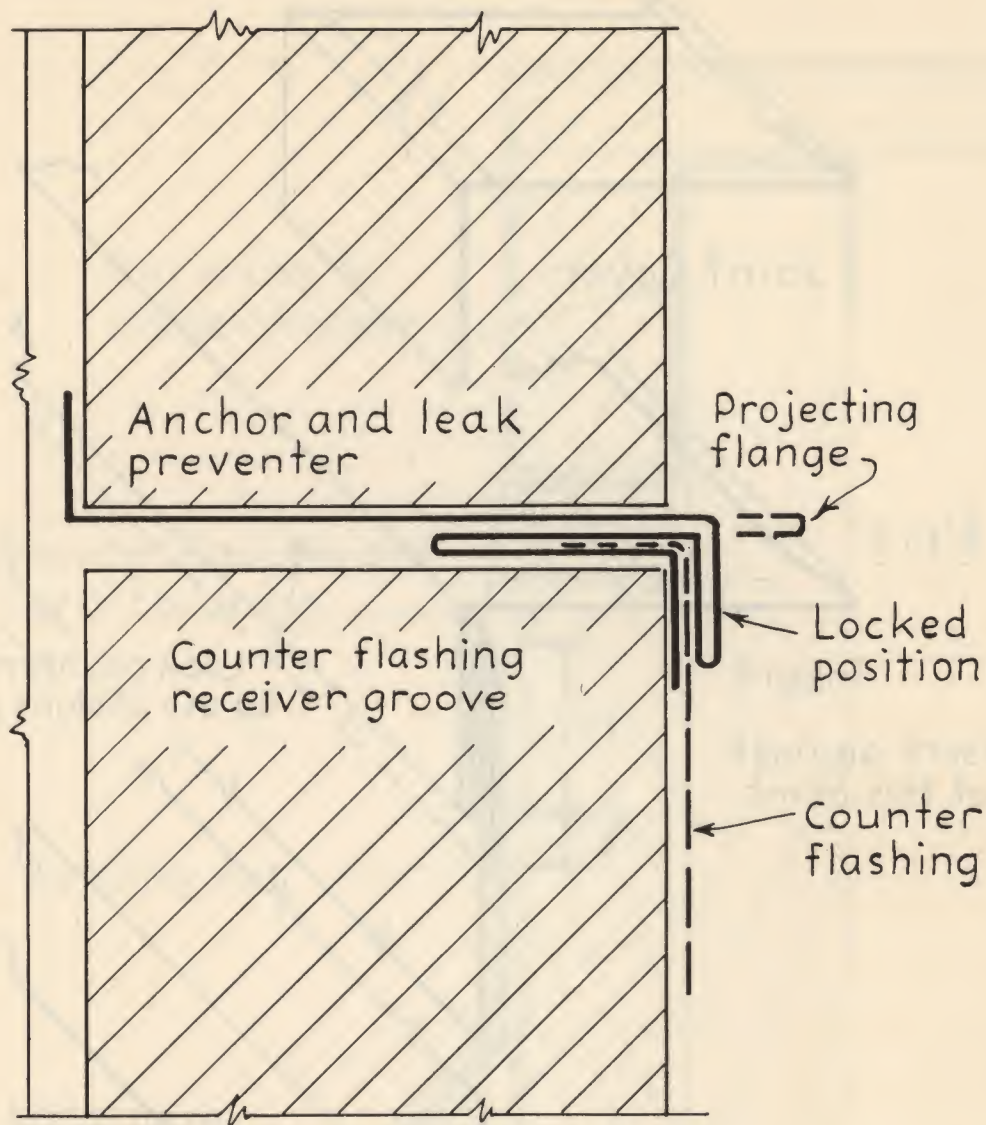
The Detail submitted by the Olson Corp. shows another construction which allows opening up for

re-roofing. In the Olson construction the exposed vertical face is doubled—a stiffer construction.

The Detail submitted by the Pauley Company has only a single thickness of metal embedded in the mortar joint. The doubled exterior face is stiff, but can be opened up for re-roofing. In the Pauley construction, the end joints are covered with the "Joint Cover" shown in a sketch.

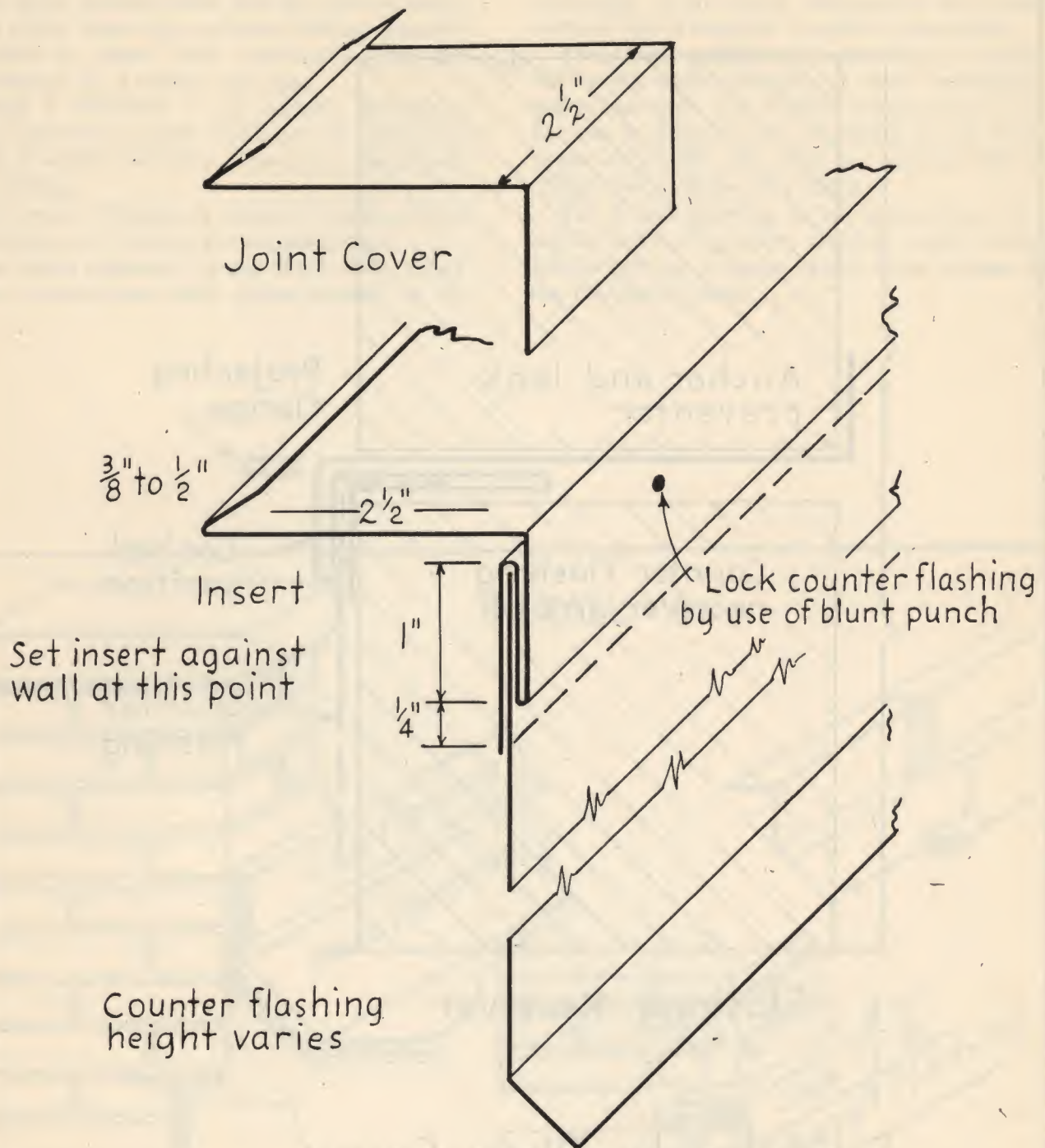
The Detail showing metal construction for a scuttle and curb provides complete metal covering for the curb top surfaces—which cover becomes the cap flashing as shown.



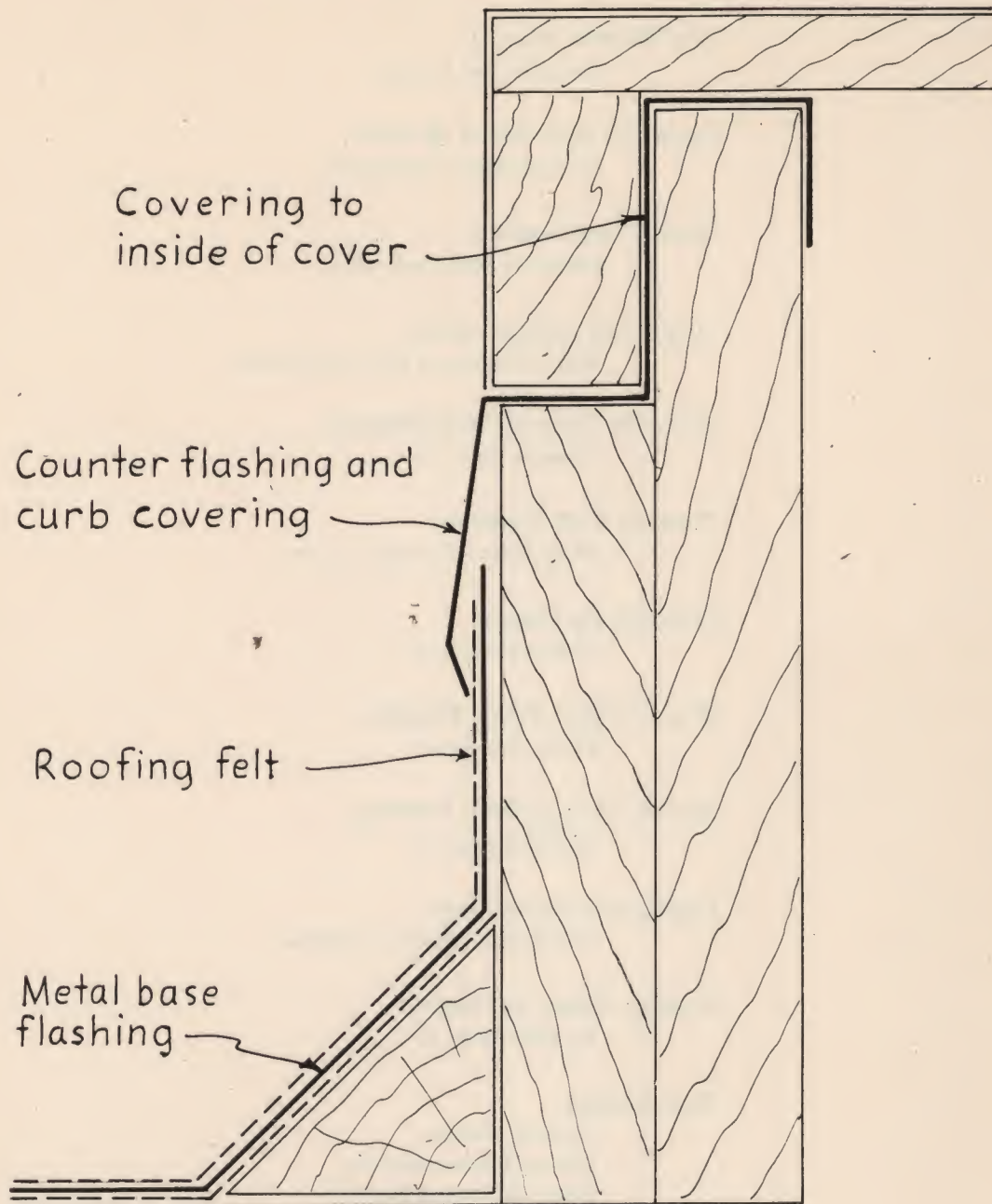


Flashing Receiver

Submitted by Olson Corp.



Submitted by Ray E. Pauley Company, Inc.



Detail of Scuttle & Curb

Reference

Sheet Copper

Copper and Brass Research Association

Zinc Workers Manual

American Zinc Institute

Guide For Sheet Metal Workers

Carnegie-Illinois Corporation

Roofing Specifications

Follansbee Steel Corporation

Copper and Common Sense

Revere Copper and Brass Incorporated

Anaconda Through-Wall Flashings

American Brass Co.

Through-Wall Flashings

Chase Brass and Copper Co., Inc.

Flashings By Cheney

Cheney Flashing Co.

Wasco Copper Fabric Flashing

Wasco Flashing Co.

Sandell Through-Wall Flashing

Sandell Roofing Co.

Coping and Gravel Stops

Aluminum Company of America

Roofing, Siding and Gutters

Reynolds Metal Co.

Slate Roofing

Vermont Slate Co.

O'Brien Brothers Slate Co.

Rising and Nelson Slate Co.

Shelden Slate Co.

Ludodici-Celadon Co.

Ludowici-Celadon Co.

Lead

National Lead Company

